

Service Manual

HDTV MONITOR

Main Manual
(P7W)



Panasonic

Models

Chassis

PT-47WX52F

EP824

PT-47WX52CF

EP824

PT-47WX42F

EP824

PT-47WX42CF

EP824

This service manual is issued as a service guide for the models of the **P7W** family listed above. Included in this manual are a set of schematics, alignment procedures, disassembly procedures and a complete parts list.


WARNING! This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death.

The service technician is required to read and follow the **"Safety Precautions"** and **"Important Safety Notice"** in the Main Manual.

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Important safety notice

Special components are used in this projection television which are important for safety. These components are identified on the schematic diagram by the symbol  and printed in **BOLD TYPE** on the replacement part list. It is essential that these critical parts are replaced with the manufacturer's specified replacement part to prevent x-ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety precautions

General guidelines

An **isolation transformer** should always be used during the servicing of a PTV whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the PTV from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always replace protective devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the PTV. Use only manufacturer's recommended rating for fuses, circuits breakers, etc.

High potentials, as high as 32.5kV, are present when this PTV is operating. Operation of the PTV without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high-voltage equipment.

Extreme care should be practiced when **handling the picture tube**. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs. per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. DAG ground lead) to the anode with a well insulated wire or use a grounding probe.

X-ray precautions

The front area (between the projection tube and the lens) is enclosed by a metal box to ensure positive safety during normal and abnormal conditions when checking and repairing. To fully ensure safety, the following precautions must be observed.

1. Do not remove the lens or metal box.
2. Make sure to turn the power OFF when the lens is removed or when checking the cleanliness of the lens.
3. Do not remove the lens or metal box to check the projection tube for operation by watching it directly. Use a mirror or paper to view the image.

Before returning a serviced PTV to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage current cold check

Unplug the AC cord and connect a jumper between the two plug prongs. Press the POWER switch ON. Measure the resistance between the jumpered AC plug and expose metallic parts such as screw heads,

antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage current hot check (see figure 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between and exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other expose metallic parts.

Verify any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson model 229, Sencore model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 0.5 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the PTV must be repaired and rechecked before it is returned to the customer.

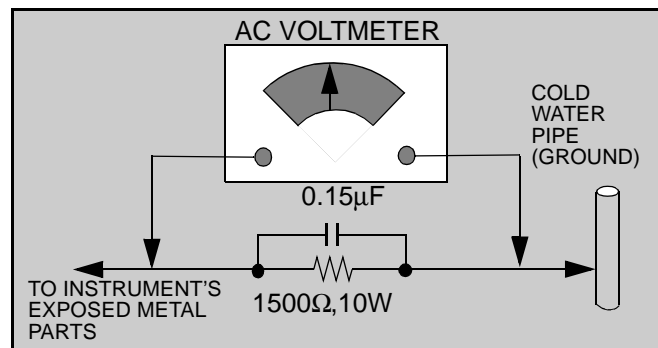


Figure 1. Hot check circuit

Insulation test

Connect an insulation tester between an exposed metallic part and AC line.

Apply 1080VAC/60Hz for 1 second. Confirm that the current measurement is 0.5mA ~ 2.0mA. Repeat test with other metallic exposed parts.

X-ray radiation

WARNING: The potential source of x-ray radiation in the PTV is in the high voltage section and the picture tube.

Note: It is important to use calibrated equipment.

Apply all black video signals (1080i) and confirm high voltage measures **31.5 ± 1.0kV**. If the high voltage is not within the range, change C514 to 1800pF, 2000pF, 2400pF or 2700pF until the desired value is obtained.

Apply NTSC white pattern and confirm the high voltage measures **30.1 ± 1.5kV**.

Apply HD 1080I white pattern and confirm the high voltage measures **30.1 ± 1.5kV**

About lead free solder (PbF)


Note: Lead is listed as (Pb) in the periodic table of elements.

In the information below, Pb will refer to Lead solder, and PbF will refer to Lead Free Solder.

The Lead Free Solder used in our manufacturing process and discussed below is (Sn+Ag+Cu).

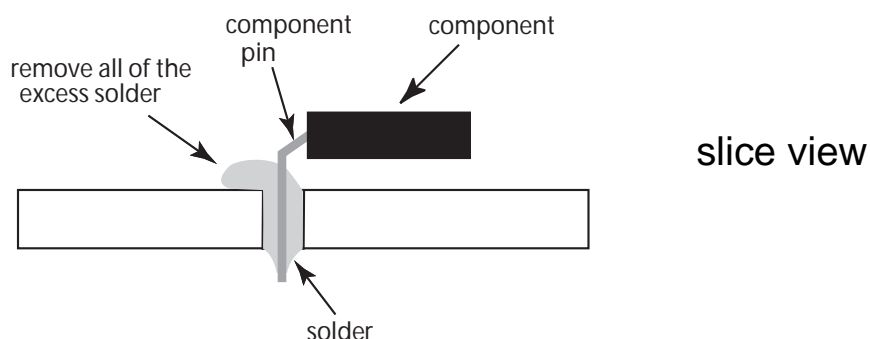
That is Tin (Sn), Silver (Ag) and (Cu) although other types are available.

This model uses Pb Free solder in it's manufacture due to environmental conservation issues. For service and repair work, we'd suggest the use of Pb free solder as well, although Pb solder may be used.

PCBs manufactured using lead free solder will have the PbF within a leaf symbol  stamped on the back of PCB.

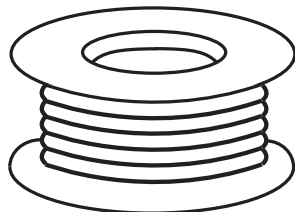
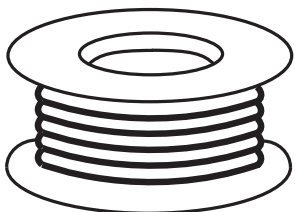
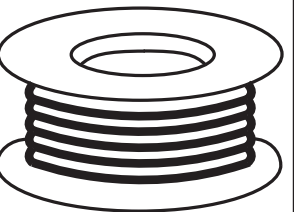
Caution

- Pb free solder has a higher melting point than standard solder. Typically the melting point is 50 ~ 70 °F (30 ~ 40 °C) higher. Please use a high temperature soldering iron and set it to 700 ± 20 °F (370 ± 10 °C).
- Pb free solder will tend to splash when heated too high (about 1100 °F or 600 °C). If you must use Pb solder, please completely remove all of the Pb free solder on the pins or solder area before applying Pb solder. If this is not practical, be sure to heat the Pb free solder until it melts, before applying Pb solder.
- After applying PbF solder to double layered boards, please check the component side for excess solder which may flow onto the opposite side. (see figure below)



Suggested Pb free solder

There are several kinds of Pb free solder available for purchase. This product uses Sn+Ag+Cu (tin, silver, copper) solder. However, Sn+Cu (tin, copper), Sn+Zn+Bi (tin, zinc, bismuth) solder can also be used.

0.3mm X 100g	0.6mm X 100g	1.0mm X 100g
		

Important safety tests

Measuring H.V. ⚠

The anode caps are cemented to the CRTs. To gain access for high voltage measurement, remove the red CRT's anode lead from the flyback transformer distributor. Grasp the anode lead protective cap at its bottom and squeeze it against the locking cap body inside, rotate 1/4 turn counter clockwise and pull the anode lead sleeve out of the FBT distributor. Connect a high voltage lead (+) from your H.V. meter to the FBT distributor, and the common (-) to cold ground (⏏). (see figure 2).

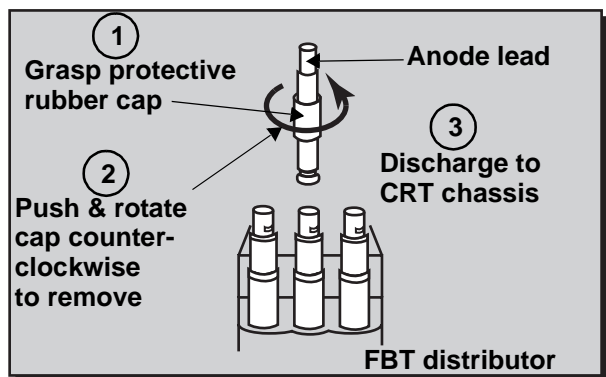


Figure 2. Removal of FBT leads

Note: Reinsert the anode lead into the FBT distributor until it is tightly and fully seated. Turn the locking cap clockwise to lock in place.

(EHT) Protector operation check

With the cabinet back removed, apply a nominal 120V AC to the PTV.

Over voltage test

Preparation:

1. Turn PTV "OFF"
2. Connect a NTSC signal generator to the antenna terminal.
3. Connect DVM (+) TPD50 and (-) TPD51 on D Board (see figure 4)

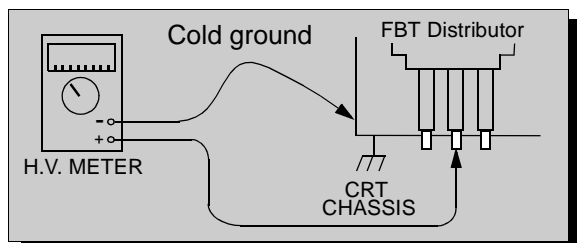


Figure 3. Measuring H.V.

4. Connect a H.V. meter (static type, class 0.1) with high voltage leads to high voltage distributor on FBT. (See figure 4)

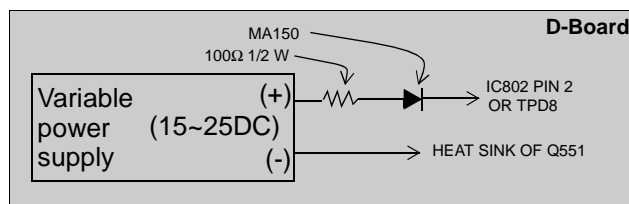
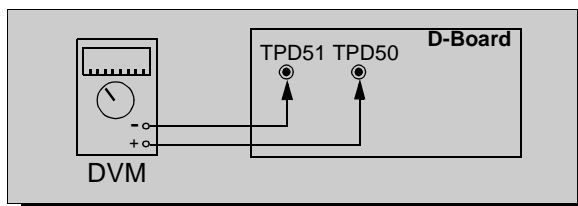


Figure 4. DVM & power supply connection.

5. Connect the 15 ~ 25 V DC variable power supply to (+) TPD8 or IC802 pin 2 (D-Board) and (-) heat sink of Q551 (see figure 4).

Procedures:

1. Apply a NTSC white pattern.
2. Turn PTV ON.
3. Adjust the picture or brightness controls so that the DVM reads 12.4 volts \pm 0.4 volts.
4. Increase the variable power supply until set turns off. The set should turn off at 12.4 volts \pm 0.4 volts (DVM) and high voltage less than 36.4kV.
5. If the DVM reading is other than 12.4 volts (\pm 0.4 volts), readjust picture or brightness control and repeat steps 3.
6. Turn off the variable supply and confirm that the set will turn on with the remote control.

About format aspect switching(WX 16:9 or HX 4:3)

Widescreen 16:9 and non-widescreen 4:3 PTVs use the same light box, for this reason is important to set it to the correct version (16:9 or 4:3). To change the format please refer to figure 62 on page 43.
Be sure to select the correct format for the serviced PTV.

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Note: These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless chip component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chip capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code - 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6k Ω resistor, 0 = 0 Ω (jumper). Chip capacitors generally do not have the value indicated on the capacitor. The color on the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicated the type and the second letter, the grade of transistor.

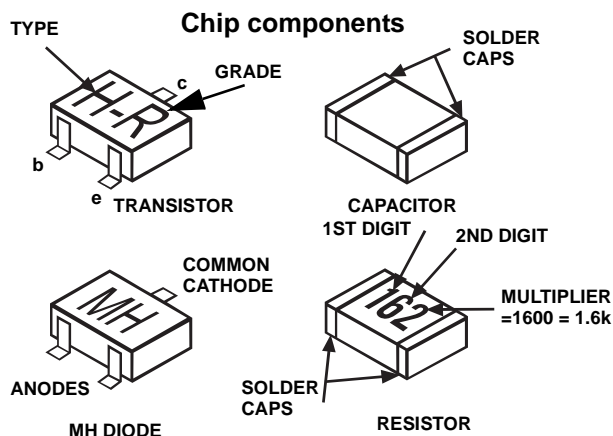
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

Component removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip component installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watts iron until solder flows. Do not apply heat for more than 3 seconds.

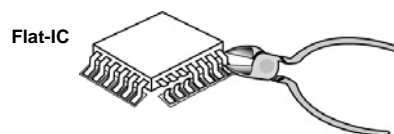


How to replace Flat-IC

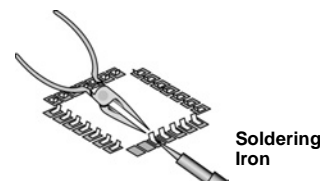
- Required tools -

- Soldering iron
- De-solder braids
- Sharp pliers (wire cutters and long nose)
- Magnifier

1. Cut the pins of the defective IC with the wire cutter pliers, and remove it completely away from the board. If the IC is glued to the board, apply hot air to complete the removal. **CAUTION-** Do not pull or twist the pliers, it may damage the soldering pads in the board.



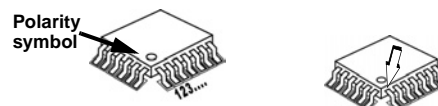
2. Using the soldering Iron and the long nose pliers, remove the IC pins that are still attached to the board.



3. Using the de-solder braid and the soldering Iron, remove the solder from the board soldering pads.



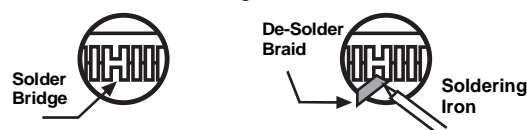
4. Position the new flat IC in place (apply the pins of the flat IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol. Start aligning and soldering Pin No.1, then align and solder the pin in the apposite corner of the IC, this will help to align the rest of the pins.



5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de-solder braid as shown in the figure below.




Service notes (continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the PTV to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground ((∇) or (\nearrow)) when servicing, or incorrect voltages will be measured.

WARNING: This PTV has been designed to meet or exceed applicable safety and x-ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X-ray radiation and shock and fire hazard, parts indicated with the symbol  on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the parts numbers listed in this service manual, or provide the chassis number and the part reference number.

For optimum performance and readability, all other parts should be replaced with components of identical specification.

Feature table

FEATURE	PT-47WX52F PT-47WX52CF	PT-47WX42F PT-47WX42CF
Chassis	P7W	
Number of channels	181	
Menu language	Eng/Span/Fr	
Closed caption (CC)	X	
V-Chip (USA/CANADA)	X	
Picture in Picture (PIP)	2T split	
VIDEO INPUT MEMORY/SKIP	SKIP	
2RF	X	
Remote control number	EUR7603Z30	EUR7603Z40
Screen protector	W/PROT SCRNB	W/O PROT SCRNB
Comb filter	ADV 3D Y/C (NEW)	
Color temp	X	
NEW YNR	X	
VM	X (DIGITAL)	
V/A norm	X	
DIGITAL SCAN RATE	1080i, 480p	
NTSC LINE-DOUBLER	480p SMOOTH PROGRESSIVE	
MTS/SAP/DBX	X	
Bass/BI/Treb control	X	
AI sound	X	
SURROUND	X	
Spatializer/BBE	BBE	
Built-in audio power	15WX2 (10%)	10WX2 (10%)
Number of speakers	4	2
A/V in (rear/front)	4 (3/1)	
S-VHS in (rear/front)	2/1	
Audio out	Fixed & Variable	
COMPONENT INPUT (Y, Pb, Pr)	2	
Dimensions WxDxH	mm in	1111x1236x626 43.74x48.66x24.64
Weight (kg/lbs)	82/180.78	
Power source (V/Hz)	120V 60Hz	
Anode voltage	31.5kV \pm 1.0kV	
Video input jack	1Vp-p 75 Ω , phono jack	
Audio input jack	500mV RMS 47k Ω	

Table 1: **Feature Table**

Specifications are subject to change without notice or obligation. Dimensions and weights are approximate.

Boards designation

BOARD	PART NUMBER	BOARD DESCRIPTION
A-Board	TNP2AH035	signal processing
D-Board	TNPH0371	power and deflection
LB-Board	TNP2AA110	blue driver
LG-Board	TNP2AA111	green driver
LR-Board	TNP2AA112	red driver
G-Board	TNP2AA090	front A/V panel
K-Board	TNP2AA089	front button panel
R-Board	TNPA0615AB	IR receiver

Table 2: **Boards designation**

Note: *The A-Board (TNP2AH035) is non-serviceable. Except for A-Board both tuners, IC2302, IC7001, IC7002, IC871, IC872, IC873. If any of these components or board is defective replace it with a new one and take back the defective board to the service center.*

Notice: *When ordering any board, add and " S" after the board suffix application.*

Example: *If Order D-Board, should be ordered as: TNPH0371 S.*

PTV - Location of controls



Figure 5. Location of controls PTV

Quick reference control operation

Quick reference control operation	
1	Power - Press to turn ON or OFF.
2	Volume - Press to adjust sound level, or to adjust audio menus, video menus, and select operating features when menus are displayed
3	Channel - Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select cable converter box channels after programming remote control infra-red codes (the TV/AUX/CABLE switch must be set in CABLE position).
4	Action - Press to display main menu and access on screen feature and adjustment menus.
5	TV/Video - Press to select TV or one of the video inputs, for the main picture or the PIP frame (when PIP frame is displayed).

Remote - location of controls

POWER Button
Press to turn ON and OFF.
MUTE Button
Press to mute sound. A second press resumes sound. Press also to access and delete Closed Caption display.
TV, VCR, DVD, CBS/CBL
Component function buttons
VOL (volume) Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.
R-TUNE (Rapid Tune) Button.
Press to switch to the previous channel.
ACTION Button
Press to display main menu and access or exit on screen features and adjustment menus.
REW, PLAY, FF, TV/VCR, STOP, PAUSE, REC & VCR CHANNEL Buttons
Component function buttons.
DBS EXIT& DBS GUIDE Buttons
DBS function buttons.
LIGHT Button
Press to light remote control buttons.
SAP
Access second audio program
ASPECT
Select picture size (ratio) to match programming format
MOVE, PIP, SPLIT/SIZE, FREEZE, SWAP, SEARCH, PIP CHANNEL
PIP function buttons



Figure 6. Location of controls (EUR7603Z30 remote)

For additional information for this remote please refer to the owner's manual section remote operation, listed on the parts list.

Remote - location of controls

POWER button
Press to turn ON and OFF.
MUTE button
Press to mute sound. A second press resumes sound. Press also to access and delete Closed Caption display.
TV, VCR, DVD, CBS/CBL
Component function buttons
VOL (volume) buttons
Press to adjust TV sound level. Use with channel buttons to navigate in menus.
R-TUNE (rapid tune) button.
Press to switch to the previous channel.
ACTION button
Press to display Main Menu and access or exit On Screen features and Adjustment Menus.
REW, PLAY, FF, TV/VCR, STOP, PAUSE, REC & VCR CHANNEL buttons
Component function buttons.
DBS EXIT& DBS GUIDE buttons
DBS function buttons.
LIGHT button
Press to light remote control buttons.
SAP
Access second audio program
ASPECT
Select picture size (ratio) to match programming format
MOVE, PIP, SPLIT/SIZE, FREEZE, SWAP, SEARCH, PIP CHANNEL
PIP function buttons



Figure 7. Location of controls (EUR7613Z40 remote)

For additional information for this remote please refer to the owner's manual section remote operation, listed on the parts list.

Auto diagnosis feature

This receiver incorporates a new auto-diagnosis feature. With this new feature will be easier for the technician to detect the failures. There is a LED located by the keyboard on the front panel, this LED will start flashing when a failure is detected by the circuits located in specific areas, depending on how many times the LED is flashing, this will tell you what circuit should be checked.

Make a count of flashing and see Table 3.

Please use this feature effectively especially for intermittent problems.

NUMBER OF FLASHES	POSSIBLE CIRCUIT
1	+140
2	LOW DC
3	CONVEREGENCE
4	HHS
5	IC4011
6	IC4018

Table 3: **SOS of front LED**

After the count:

Proceed to check that area, verify what board is the problem located, this way the area to check will be reduced until the failure is found.

A-Board check points

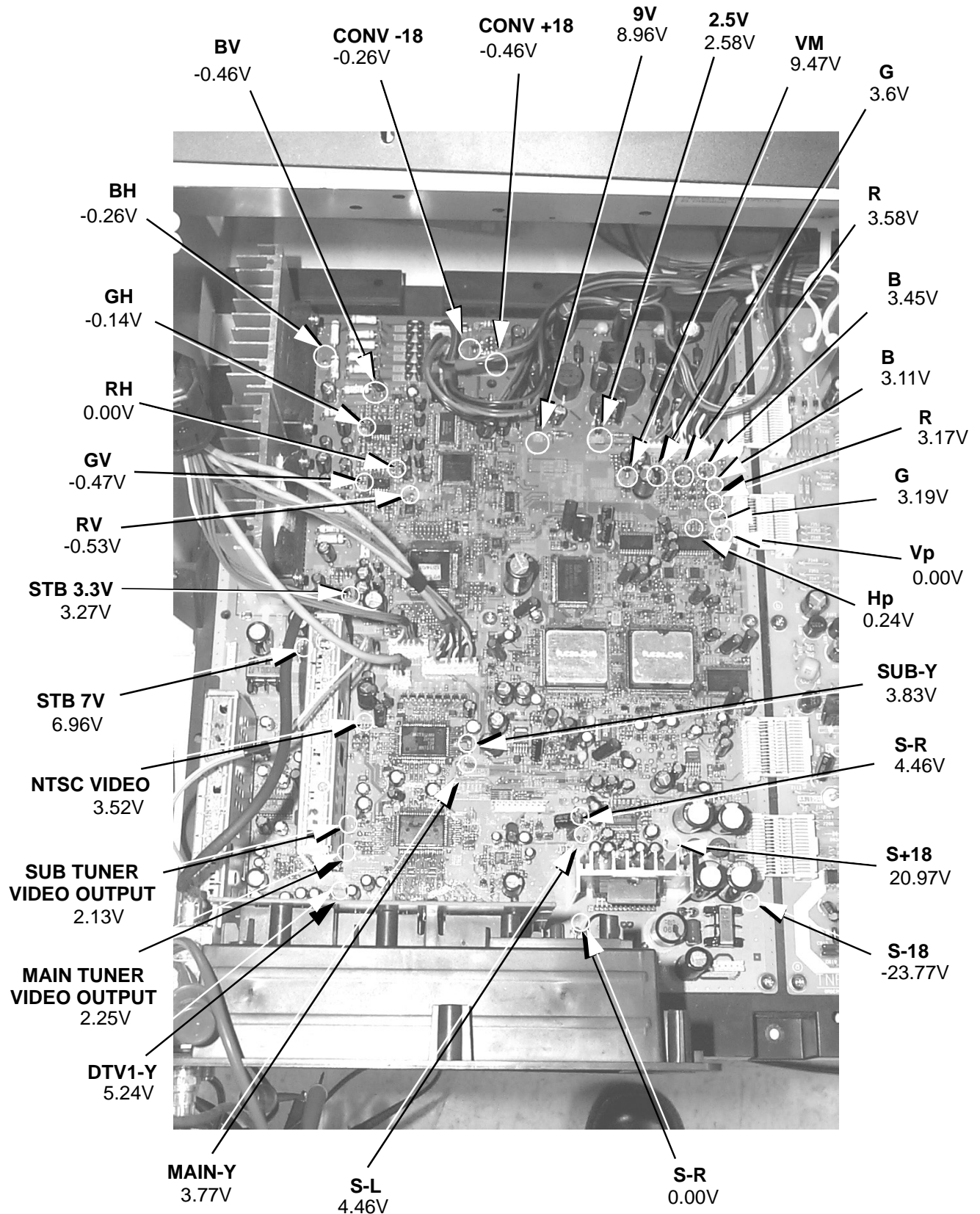
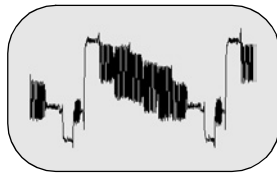


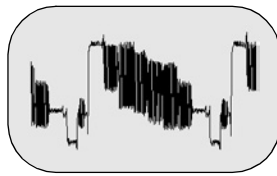
Figure 8. A-Board check points

Note: All the measurements are in DC with a digital multimeter, color bar pattern, picture settings normalized and sound set to minimum.

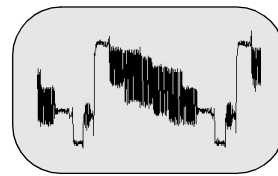
A-Board check points waveforms



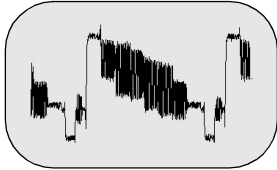
Main tuner video output
15.72 kHz, 1 Vpp,
10 μ s sec/div



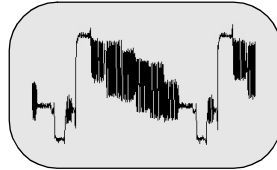
Sub tuner video output
15.72kHz, 1.00Vpp,
10 μ s sec/div



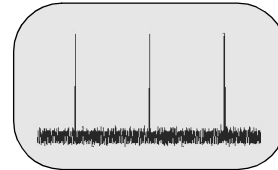
Main Y
15.72kHz, 1.00Vpp
10 μ s sec/div



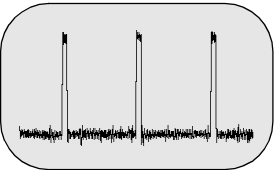
Sub Y
15.72kHz, 1.92Vpp,
10 μ s sec/div



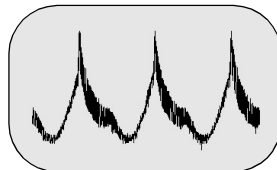
NTSC video
15.72kHz, 2.02Vpp,
10 μ s sec/div



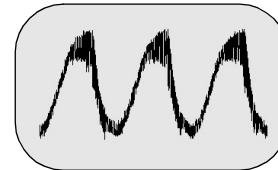
VP
60Hz, 3.36Vpp,
5 μ s sec/div



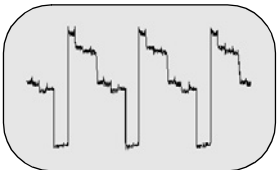
HP
31.65kHz, 3.32Vpp,
10 μ s sec/div



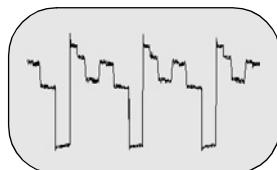
Conv -18
60.24Hz, 0.75Vpp,
5 μ s sec/div



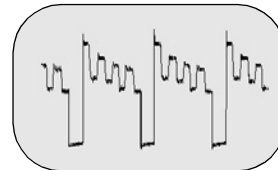
Conv +18
60.24Hz, 0.24Vpp,
5 μ s sec/div



G
31.65kHz, 4.72Vpp,
10 μ s sec/div



R
31.65kHz, 4.44Vpp,
10 μ s sec/div



B
31.65kHz, 4.40Vpp,
10 μ s sec/div

Figure 9. A-Board check points waveforms.

Note: Waveforms were obtained with colorbar pattern, picture settings normalized and sound set to minimum.

Chassis & boards layout

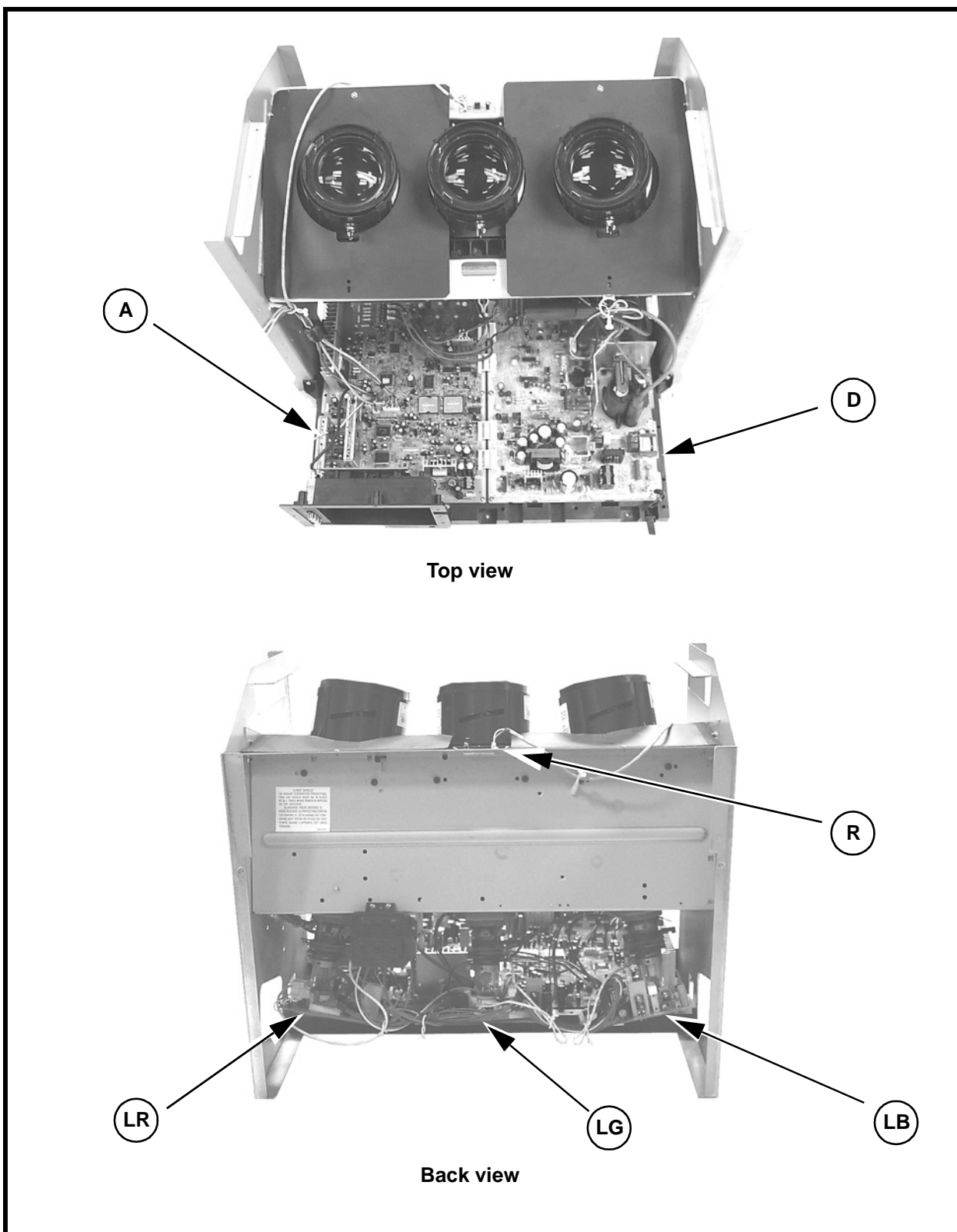


Figure 10. Chassis & boards layout.

Board description

A	Main chassis, video processing, convergence, audio processing	LB	Blue CRT output
D	Power supply, vertical out, horizontal out	LG	Green CRT output
		LR	Red CRT output
		R	IR sensor

Disassembly for service

Note: Board ground wires may have to be disconnected to disassemble some boards. All ground wires must be reconnected using jumper leads, if necessary, before power is applied to PTV for service.

Speaker grille removal (figure 11)

The speaker grille is secured to the cabinet of the PTV. grip panel from the sides and middle upper part, gently pull forward to remove. When reassembling, make certain to firmly press on the panel where the insertion points (5) are located, one at each corner and one at the middle top edge.

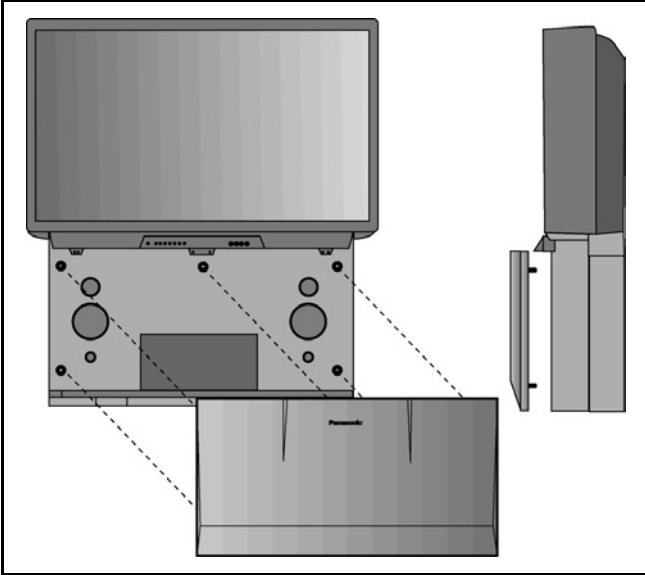


Figure 11. Speaker grille removal.

Keyboard removal

1. Remove the speaker grille. See figure 11.
2. Unplug the connectors from the Keyboard and front A/V inputs assemblies. Remove the screws affixing the keyboard to the frame assembly. Tilt the keyboard assembly upward and release it from the screen frame assembly.

Speakers replacement

1. Remove the speaker grille. See figure 11.
2. Each speaker is secured to the cabinet with (4) screws.
3. Disconnect the R & L speaker lead connectors from the speaker units.

Cabinet back lower cover removal (figure 12)

1. Remove (7) hex screws around the perimeter, marked with arrows. See figure 12 for screws location.
2. Remove (3) screws from around the A/V terminal board (marked with arrows).

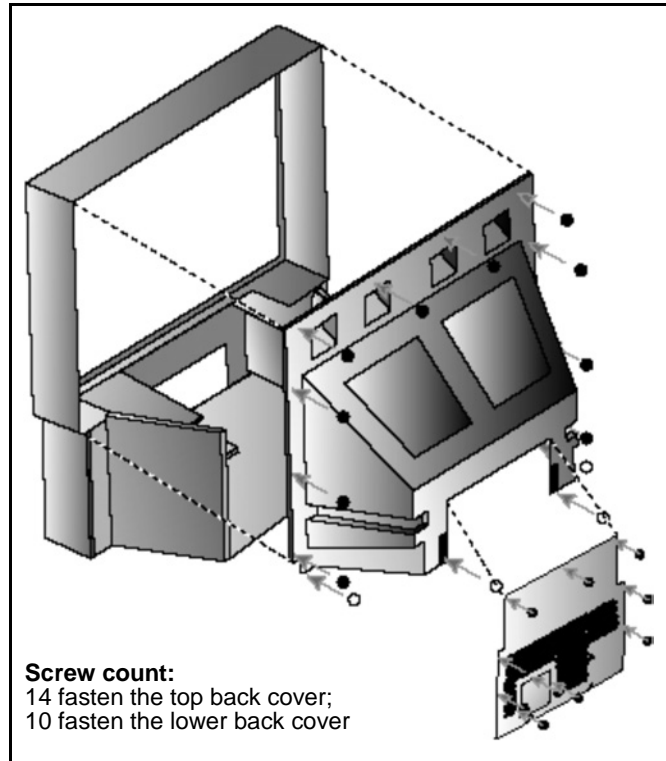


Figure 12. Lower cabinet back removal

Cabinet back cover removal (figure 12)

1. Remove the cabinet back lower cover. (Detailed previously).
2. The top back cover (plastic shell) is secured with (14) screws around its perimeter. See figure 12 for screws location.
3. Be careful not to damage the mirror secured to the underside of the back cover.

Mirror removal (figure 13)

The mirror is attached inside the cabinet cover. Carefully remove the cabinet cover to access its interior surface and remove the screws securing the brackets that hold the mirror at the top and sides to the mirror. See figure 13.

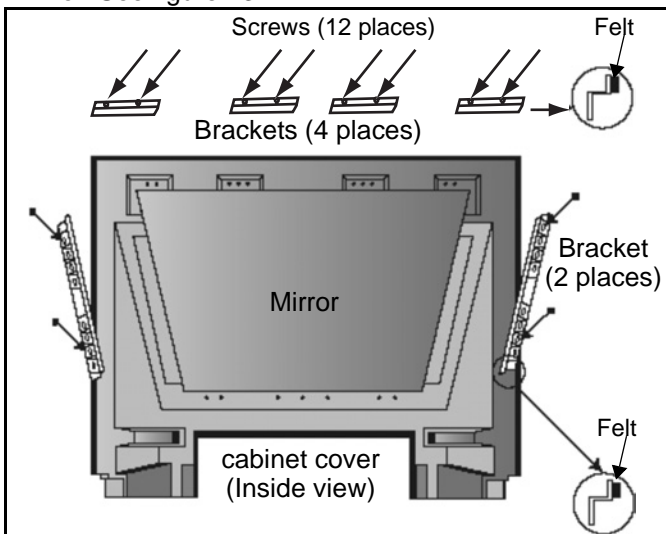


Figure 13. Mirror removal

Disassembly for service (continued)

Screen frame removal

1. Remove the speaker grille. Disconnect the cables leading to the keyboard and the AV panels and remove the keyboard and AV panel assembly. The assembly is secured by three (3) screws.
2. At this point the front cover is held only by four screws, be careful not to push the cabinet forward.
3. Remove screws and tilt the assembly forward while lifting it out of place.

Screen assembly (figure 14)

1. Remove the screen frame. See screen frame removal procedure above.
2. Place screen frame face down on a soft surface.
3. Remove all screen brackets and corner brackets

Note: The brackets are painted black (permanent marker) on the edge to prevent reflection on image.

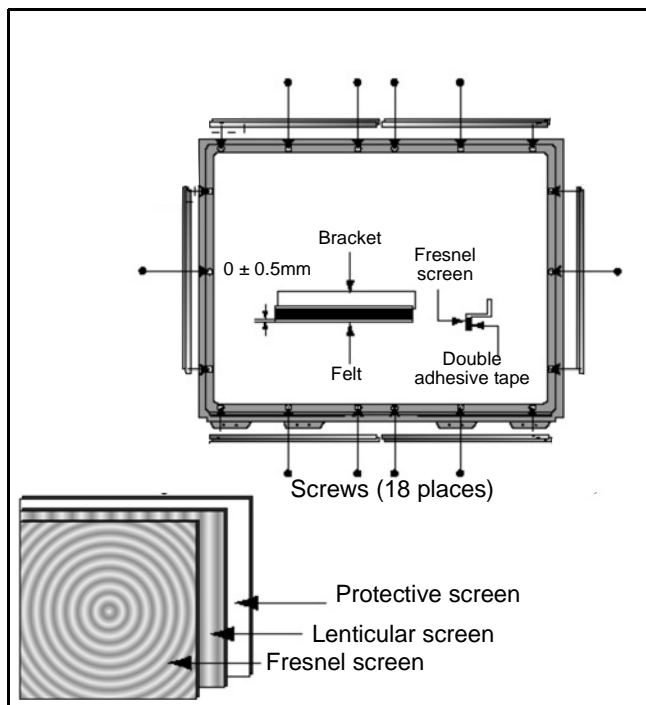


Figure 14. Screen assembly

4. Note exact orientation and order of each screen. The orientation and order of the screens is critical for displaying pictures properly. Detailed screen assembly can be seen in figure 14.

Main chassis block (figure 15)

1. Remove the speaker grille. See figure 11.
2. Remove the cabinet back lower cover. See figure 12.
3. The main chassis block is secured to the cabinet by screws at front, behind the Speaker Grill and inside on the bottom of the optical frame).
4. Remove the horizontal barrier panel at the back of the cabinet.
5. Unplug connectors (K1, G1 and speaker connectors) and pull out the main chassis block.

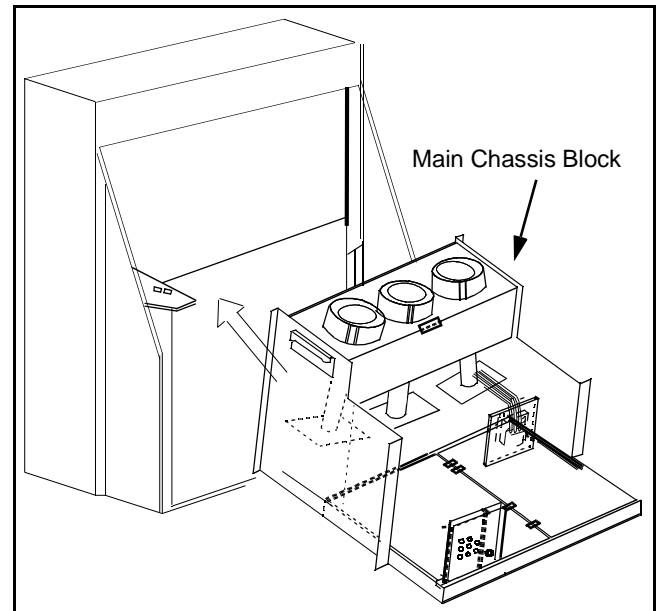


Figure 15. Chassis removal

Note: Main chassis block can be serviced either in normal position or laying on its back (protect hookup terminal from damage).

Chassis assembly

The chassis assembly shown in figure 18 includes all the electrical and optical (light box) components.

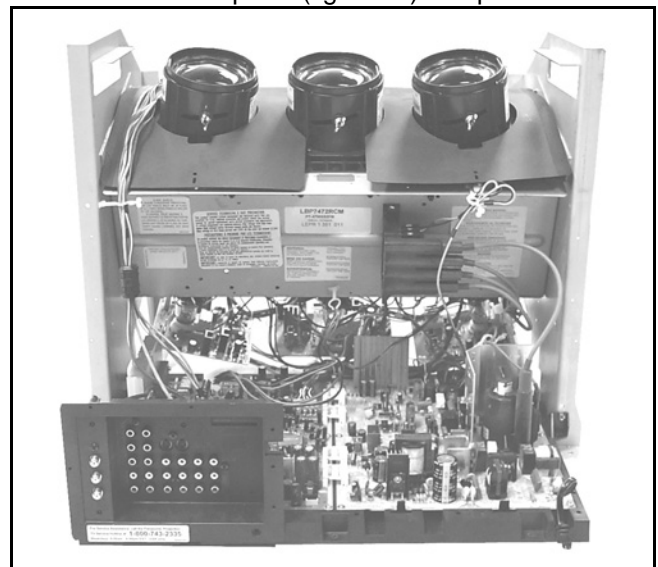


Figure 16. Chassis rear view

Disassembly for service (continued)

Disassembly for CRT replacement

To facilitate CRT replacement, the complete CRT mounting chassis does not need to be removed.

1. Remove the main chassis block from the cabinet. See figure 15.
2. Remove the optical bracket metal cover (rear side) by removing (6) screws from back, (2) screws from top, and (2) screws from each side. See figure 17 & figure 18.

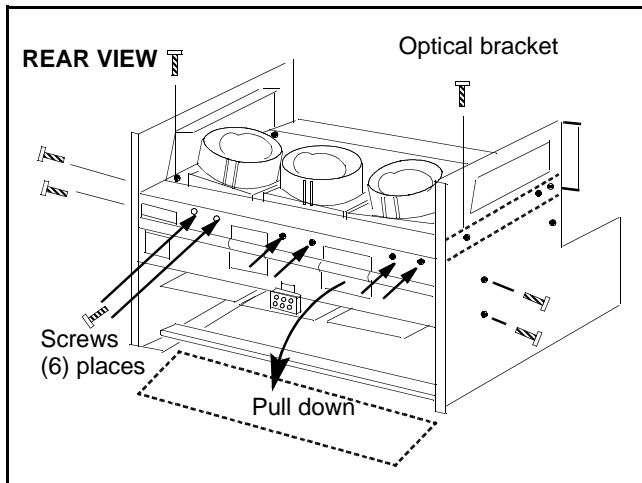


Figure 17. CRT replacement

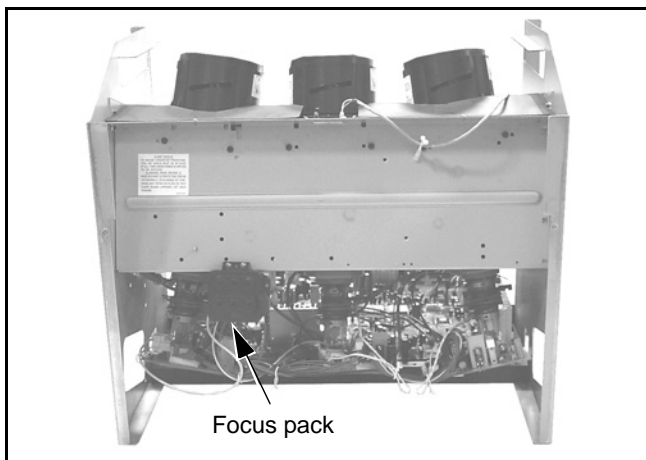


Figure 18. Light box front view

3. Remove the defective CRT anode lead from the high voltage distributor block that is mounted on the flyback transformer. Discharge to CRT chassis.
4. Unplug connectors from the B-Board. See board layout. B9 for red, B10 for green, or B11 for blue.
5. Unplug the defective CRT black DAG ground connector from the CRT Board.
6. Remove the CRT Board from the defective CRT neck.
7. Remove (2) screws from the defective CRT housing. See figure 19.**

CAUTION: Do not remove the (4) CRT lens screws.

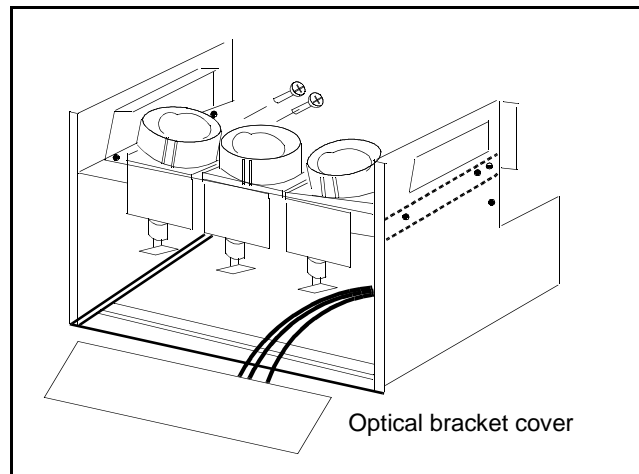


Figure 19. CRT replacement.

**** CAUTION:** Support the CRT assembly when loosening screws.

8. Release CRT anode lead from CRT chassis wire clamp and all other wires from holders.
9. Loosen a screw that secures the DY and remove it from the CRT neck.

Caution: To insure x-ray radiation protection, the lens must be mounted in place at all times when power is applied to the PTV.

CRT replacement

1. Remove CRT focus lens assembly (4 screws).

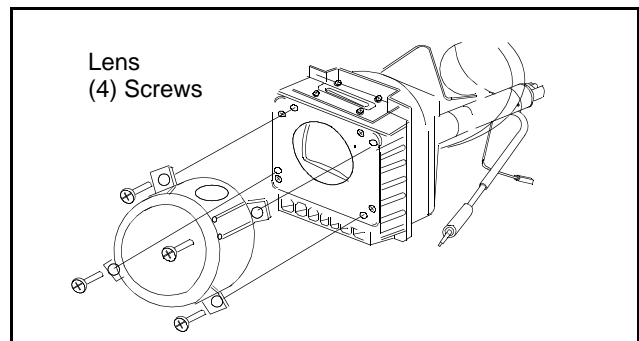


Figure 20. CRT assembly.

2. Lay CRT face down on a soft cloth.
3. Note position of yoke with centering tabs and remove from defective CRT.
4. Remove CRT DAG ground from defective CRT. Mount it on the replacement CRT exactly as it was on the defective CRT.

Note: Replacement CRT is supplied with H.V. anode lead attached.

5. Wire the anode lead wire.

6. Wire the anode lead wire.

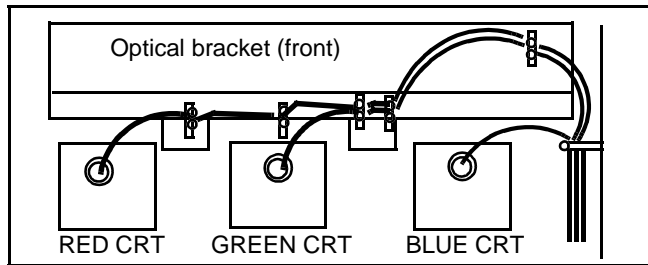


Figure 21. Wire guide.

7. Install yoke with other CRT neck assemblies on CRT neck in the same order and position as removed from the defective CRT.

8. Press yoke against bell of CRT and tighten the clamp just snug enough so it will not easily shift.
9. Assemble CRT focus lens assembly to new CRT with (4) screws. Make sure focus lens adjustment nut is in the same location as on other CRT focus lens.

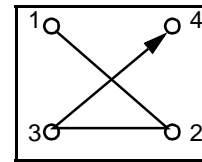


Figure 22. CRT screw tightening order.

Note: Please assemble with screws in the order shown and tighten with the same torque.

Optical block position adjustment

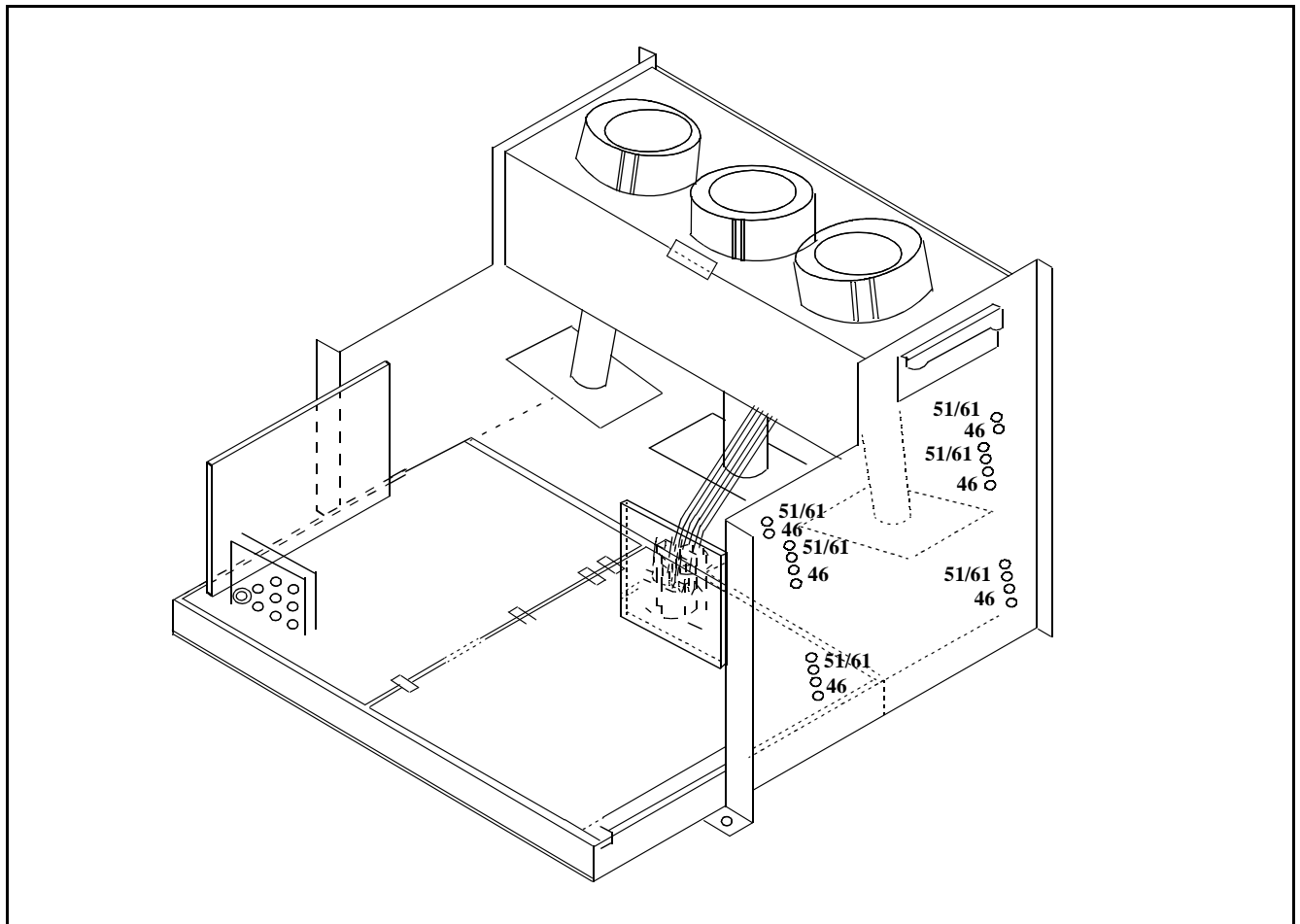


Figure 23. Optical block position.

The optical block mounting has holes to allow for the different size projection screens. These mounts will adjust to projection screens.

If the optical block is removed for service or is replaced, it is important that the correct mounting holes are used.

PTV screen assemblies

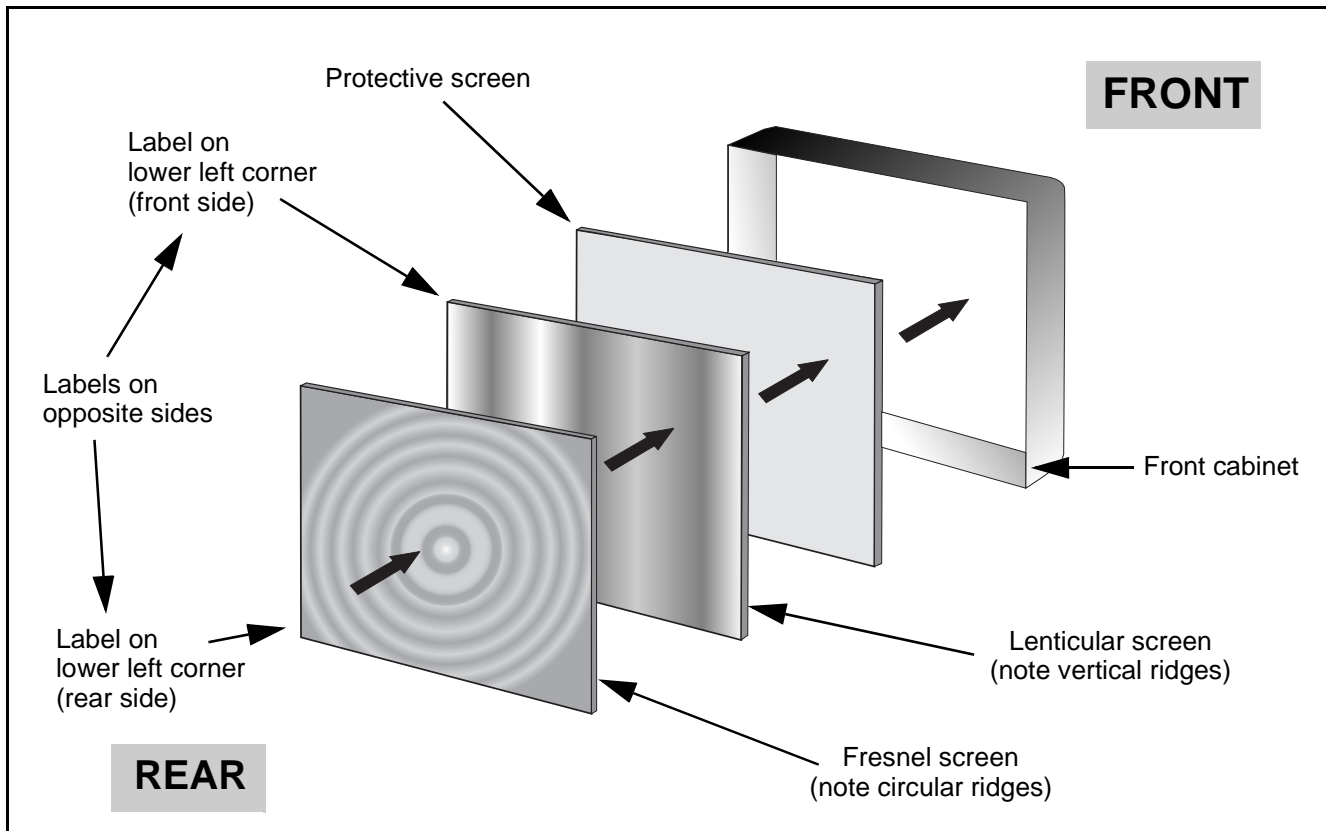


Figure 24. Screen assemblies.

B+ voltages table

Preparation:

Set the following controls

Picture.....Normal.
Bright.....Normal.
Volume.....Min. (0).

Procedure:

1. Apply a white NTSC pattern.
2. Connect the (-) lead of the digital voltmeter to TPGND1 (cold ground).
3. Connect the (+) lead of the digital voltmeter to each test point and confirm the B+ voltages (see Table 4).

No.	Test point (D-Board)	Voltage
1	TPD14	138.6±1.0
2	TPD13	19.0±1.5
3	TPD12	19.0±1.5
4	TPD11	-19.0±1.5
5	TPD10	22.0±1.5
6	C845 (-)	-22.5±1.5
No.	Test point (A-Board)	Voltage
1	TPA031	9.0±0.5
2	TPA030	5.0±0.5

Table 4: B+ voltages table

CRT set up

CAUTION: Insure yoke plugs on the A-Board are reconnected before turning the PTV ON to prevent damage to the horizontal output transistor and/or CRTs.

1. Connect test generator to the antenna terminal and set for a monoscope pattern.
2. Loosen yoke clamp, seat yoke against bell of CRT and rotate to correct yoke tilt (compare to adjacent CRT). Tighten yoke clamp.
3. Remove adhesive from centering tabs and set centering tabs for zero correction. (figure 25)

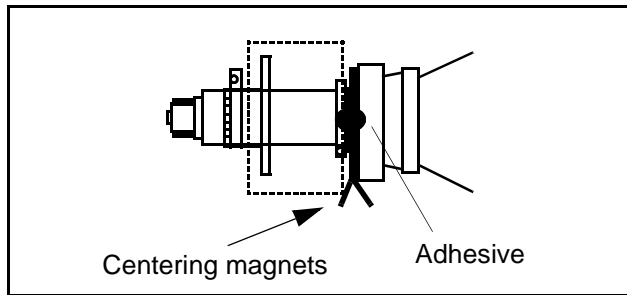


Figure 25. Adhesive removal

4. Cover replacement CRT lens and static converge the tubes not replaced, if needed. Check size and linearity of pattern and adjust as required.
5. Uncover replacement CRT lens and cover other two CRT lenses. Adjust electrical and optical focus (lens), if required.
6. Uncover all CRT lenses and use yoke centering magnet to converge replacement CRT (in center area of screen only) with other two CRTs. Disregard non-convergence in areas other than center area.
7. Perform white balance adjustments.

Dynamic focus adjustments

1. Focus adjustments should be performed after 1 hour of aging.
2. Use oscilloscope with 100 : 1 probe.
3. Apply a NTSC crosshatch pattern to adjust focus.
4. Adjust the red, blue and green focus VR on the focus block for best focus of overall picture of each CRT. (figure 28)

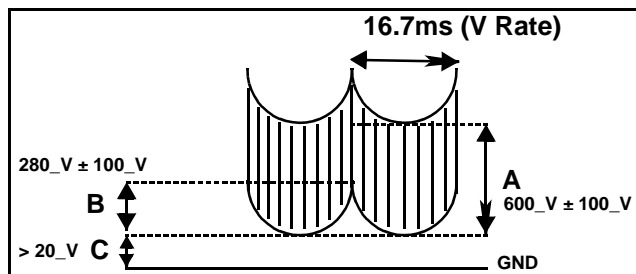


Figure 26. D. Focus adjustment waveform

5. To change DAF DATA, enter to service mode, then press POWER on remote to display DACs menu, then select DAC by pressing CH (RIGHT/LEFT) and VOL (UP/DOWN), then press ACTION to enter to DAC, then adjust by pressing VOL (RIGHT/LEFT); press ACTION, to save press ACTION again or OTHER to exit without saving.

Procedure:

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Enter to service mode and set the following default DATA:

	NTSC	NTSC ZOOM	1125i
H-PARA	+317	+263	+317
V-SAW	-23	-35	-23
V-PARA	+69	+117	+69

Note: The signal (NTSC, 1125i) (NTSC ZOOM option), should be displayed to enter values for specific format adjustment.

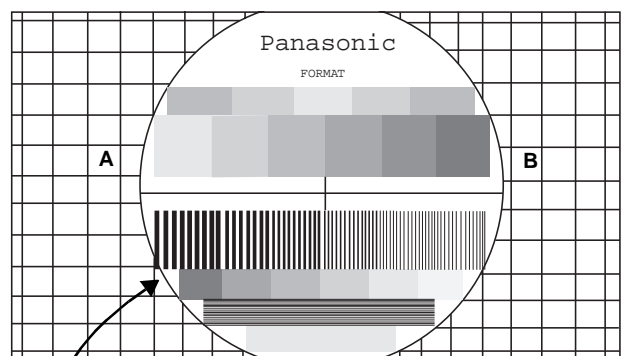
2. For 1125i (1080i) set the default values.
3. For NTSC and NTSC ZOOM apply a white pattern and perform the following steps.
4. Connect the scope probe to TPD30, GND to TPD31.
5. Confirm that level of A is $600_V \pm 100_V$, adjust H-PAR DAC to set to specification level.
6. Confirm that level of B is $280_V \pm 50_V$, adjust V-PAR DAC to set to specification level.
7. Confirm that level of C is more tha 20 V, adjust H-PAR DAC to set to specification level.

Focus - Electrical & optical adjustments
(use for minor adjustment or for final adjustment, for complete adjustment see following section.)

Electrical adjustment

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Apply a NTSC crosshatch with dots pattern.



Adjust electric focus VR and lens focus on this circle

Figure 27. Lens focus adjustment

Table 5: Focus points

	RED	GREEN	BLUE
Electric focus	B	A/B	A
Optical Focus	B	A/B	A

- Set VIDEO C_OFF DAC from 00 to 02, and project only red. Adjust red focus VR so that focus is best..

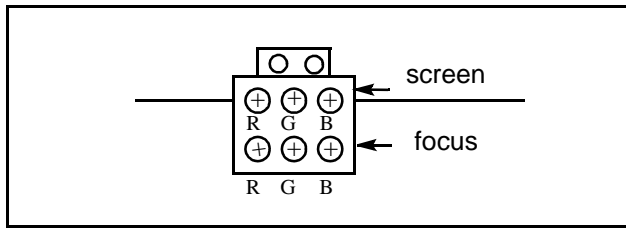


Figure 28. **Focus pack**

- Adjust red lens focus (mechanical) until focus is best.
- Adjust red focus VR again.
- Set VIDEO C_OFF DAC from 00 to 01, and project only green.
- Repeat steps for green only.
- Set VIDEO C_OFF DAC from 00 to 03, and project only blue.
- Repeat steps for blue only.

Focus - Optical lens adjustment

Optical adjustments

Note: This adjustment normally should not require resetting unless the lens has been replaced or adjustment has changed.

- Optical focus adjustment is located on the top of each CRT lens system. Loosen the adjustment knurled locking knob. (figure 29)

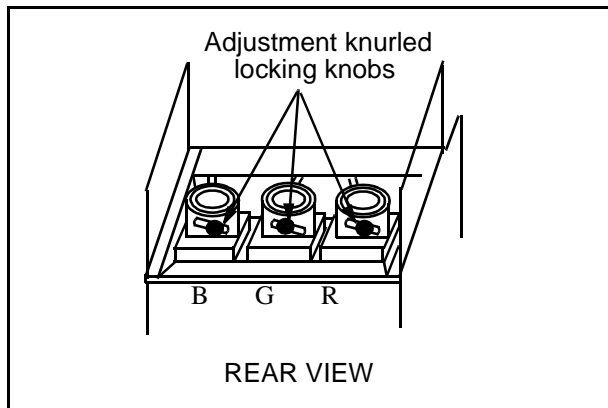


Figure 29. **Optical lens focus adjustment**

- Turn the PTV ON. Apply and view a crosshatch with dots pattern.
- Adjust each lens focus for best focus while viewing each CRT.
- Cover the red and blue CRT, projecting green only. Rotate the green lens for best focus around screen center area.
- Do the same for the red focus lens while projecting red only.
- Repeat for blue.

Electric & VM focus adjustment, complete adjustment

(Perform this adjustment when a CRT is replaced or when major adjustment is required)

Preparation:

- Apply a NTSC crosshatch pattern with dots.
- Set CONV "MUTE" DAC from 0 to 1 (disabling digital convergence.)
- Position the longer tab of the four-pole magnet to 90 degrees (uncorrected position). (see figure 31).

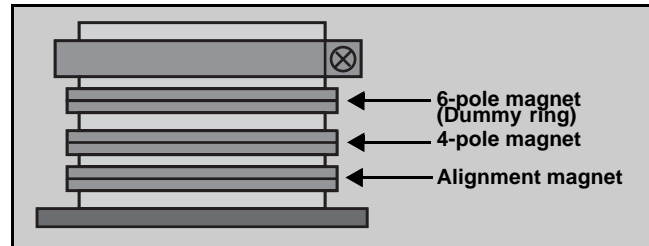


Figure 30. **VM coil with focus correction magnet**

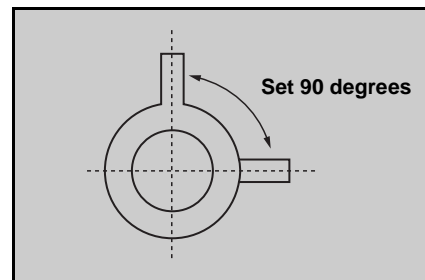


Figure 31. **4-pole magnet**

- Position the long tab of all alignment magnets and of the dummy ring together in an uncorrected position. (See figure 32).

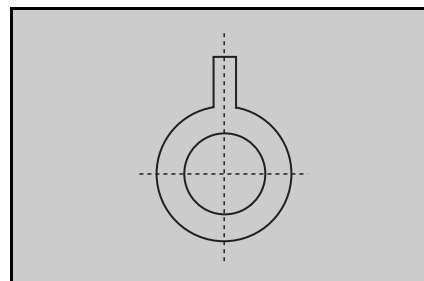


Figure 32. **Alignment magnet (or dummy ring)**

Procedure:

- Apply an NTSC cross hatch pattern with dots.
- Assure that digital convergence is disabled (DAC MUTE from 0 to 1).
- Set VIDEO "C_OFF" DAC from 00 to 02, to project red only.
- Turn the red electrical focus adjustment VR (on focus pack) fully counterclockwise and note the position of the dots at the center of the picture.
- Turn the red electrical focus adjustment VR fully clockwise.

6. If the position of the dots at the center of the screen moves from the position noted in step 4., adjust the alignment magnets until the dots are in the same position as noted in step 4.
7. Turn the red electrical focus adjustment VR (on focus pack) fully counterclockwise and confirm that the position of the dots at the center of the screen did not move from their position noted in step 4.
8. If the position of the dots at the center of screen moved, repeat from step 4.
9. If the position of the dots moved after repeated adjustments, adjust until the movement of the dots is minimized.
10. Turn the red focus VR fully clockwise.
11. Adjust the 4-pole magnets until the shape of the dots at the center of the screen is circular.
12. Adjust red focus VR until optimum focus is achieved.
13. Apply NTSC crosshatch with dots or any other available pattern applicable to the following.
14. Confirm that the picture is correctly aligned in the center of the screen, shown in figure 33, adjust the centering magnets. Repeat the alignment magnet adjustments and four pole magnet adjustments (step 1. ~ step 12.).

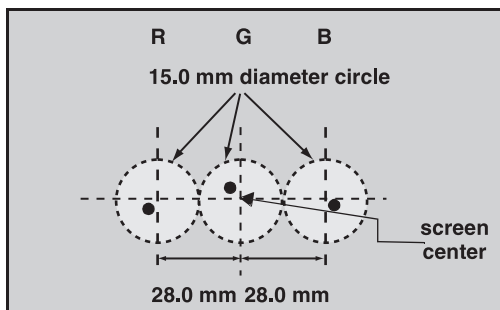


Figure 33. Centering magnet

15. Apply an NTSC cross hatch pattern with dots.
16. Set VIDEO "C_OFF" DAC from 00 to 01, to project green only.
17. Repeat above procedures for the green.
18. Set VIDEO "C_OFF" DAC from 00 to 02, to project red only.
19. Repeat above procedures for the blue.
20. Enable digital convergence by changing DAC MUTE from 01 to 00.
21. Following adjustments, paint position of DY centering magnets and fix the centering magnets of DY, dummy rings of VM coil, four pole magnets of VM coil and the alignment magnets of VM coil to prevent them from moving.

Note: Please See "Service mode (electronic controls)" on page 34 for entering and exiting service mode.

NTSC Vertical size adjustment (VSIZE)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Apply a NTSC pattern (see above note) .
2. Set VIDEO "C_OFF" DAC from 00 to 01 (to project only green).
3. Adjust centering magnets so that the center of the pattern get aligned with screen frame center.
4. Adjust VDEF "VSIZE" DAC until vertical size is proportional on top and bottom. (See figure 34)
5. Set VIDEO "C_OFF" DAC from 01 to 00

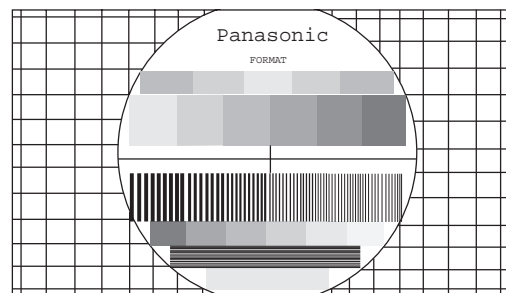


Figure 34. Vertical size adjustment

HD 1080i Vertical size adjustment (VSIZE)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Apply a HD 1080i pattern (see above note).
2. Repeat vertical size adjustment from step 2

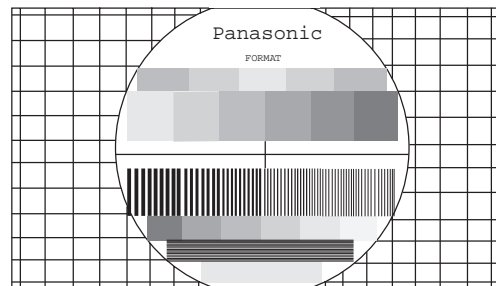


Figure 35. Vertical size adjustment

NTSC ZOOM Vertical size adjustment (VSIZE)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Apply a NTSC pattern (see above note) .
2. Change aspect to ZOOM mode.
3. Repeat vertical size adjustment from step 2
4. Try making circle seem rounded (in proportion)

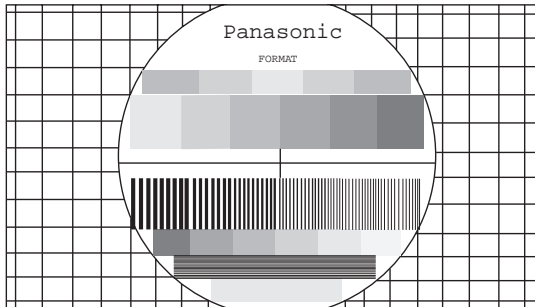


Figure 36. Vertical size adjustment

NTSC Horizontal phase adjustment (H-POS)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Apply a NTSC crosshatch pattern with dots.
2. Set CONV "MUTE" DAC from 00 to 01 (disabling digital convergence).
3. Set VIDEO "C_OFF" DAC from 00 to 01 to project only green.
4. Turn green deflection yoke until line is perfectly horizontal.
5. Adjust H-POS DAC data so that pattern is in the center of screen.

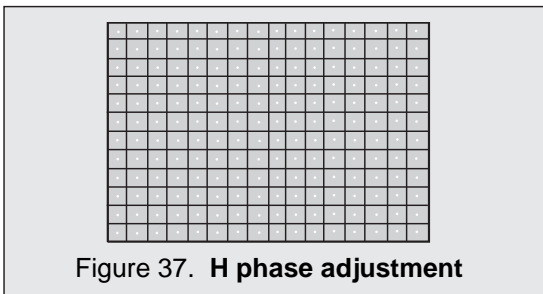


Figure 37. H phase adjustment

6. Enable digital convergence by changing DAC MUTE from 01 to 00.
7. Set VIDEO "C_OFF" DAC from 01 to 00.

HD 1080i Horizontal phase adjustment (H-POS)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Apply a HD 1080i pattern.
2. Repeat NTSC horizontal phase adjustment from step 2.

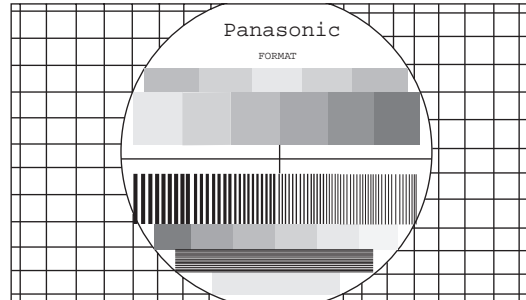


Figure 38. H Phase adjustment

Trapezoid adjustment (EWTRA)

1. Set default value

NTSC Pincushion adjustment (PCC)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

Procedure:

1. Apply a NTSC crosshatch pattern with dots.
2. Set VIDEO "C_OFF" DAC from 00 to 01 to project only green.
3. Set DAC MUTE from 00 to 01 (disabling digital convergence).
4. If the distance at "A" is not $10 \pm 5\text{mm}$, enter "H DEF" "H WID" mode and adjust by VOLUME UP/DOWN until it is $10 \pm 5\text{mm}$. See figure 39.

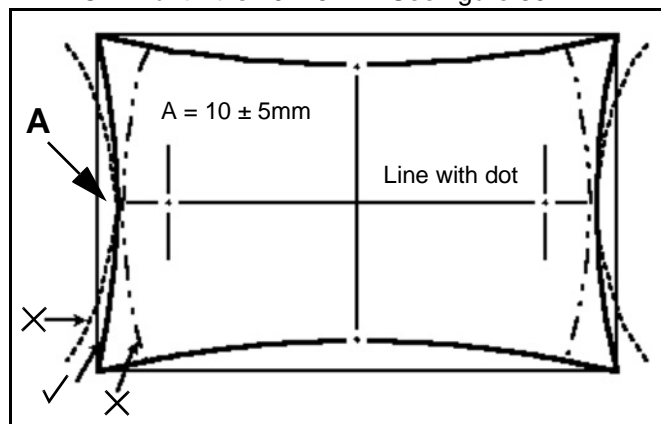
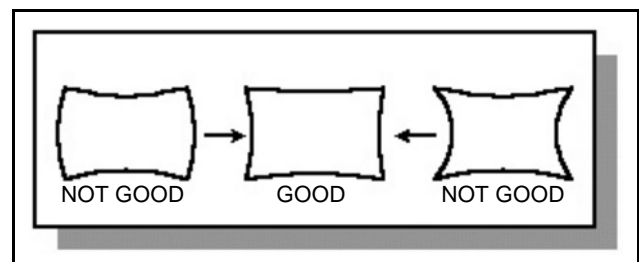


Figure 39. Pincushion adjustment



5. If not all corners of cross hatch appear in screen, enter V DEF "V SIZE" mode and adjust until they appear.

6. Confirm that measurement of "A" has not changed.
7. Enable digital convergence by changing DAC MUTE from 01 to 00.
8. Set VIDEO "C_OFF" DAC from 01 to 00.

HD 1080i Pincushion adjustment (PCC)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

Procedure:

1. Apply a HD 1080i pattern.
2. Repeat NTSC pincushion adjustment from step 2

Centering magnets adjustment

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

Procedures:

1. Apply a NTSC crosshatch pattern with dots.
2. Set VIDEO "C_OFF" DAC from 00 to 01 to project only green.
3. Set DAC MUTE from 00 to 01 (disabling digital convergence).
4. Loosen the deflection coil screw on the green CRT.
5. Adjust green deflection coil until the horizontal center line is horizontal.
6. Adjust centering magnets until the green pattern is equal on left and right. Adjust also for horizontal and vertical tilt.

Note: Push deflection coil to top of CRT neck, then tighten deflection screw after adjusting each CRT centering and tilt.

7. Set VIDEO "C_OFF" DAC from 01 to 03 to project only blue. Adjust deflection coil until the horizontal center line matches the pattern of the grid and is leveled.
8. Adjust blue centering magnets until the pattern center is at the appropriate distance as indicated on figure 40.

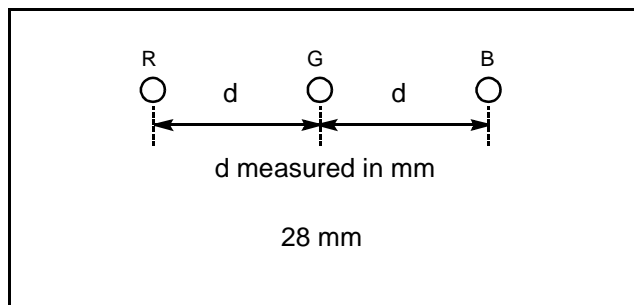


Figure 40. Centering magnets adjustment.

9. Set VIDEO "C_OFF" DAC from 01 to 02 to project only red.
10. Adjust red deflection coil until the horizontal center line matches the pattern of the grid and is leveled.
11. Adjust red centering magnets until the pattern center is at the appropriate distance as indicated on figure 40.

12. Enable digital convergence by changing DAC MUTE from 01 to 00.
13. Set VIDEO "C_OFF" DAC from 02 to 00. Following the adjustment, make sure that all deflection coils are pushed completely toward the CRT cones and that all screws are tightened.

NTSC Horizontal size adjustment (H WID)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

This adjustment is intended to adjust horizontal size of the picture.

1. Apply a NTSC pattern.
2. Set VIDEO "C_OFF" DAC from 00 to 01 to project only green.
3. Set DAC MUTE from 00 to 01 (disabling digital convergence).
4. In service mode, adjust H-WID DAC until the picture horizontal size is balanced at left and right side of screen.
5. Set DAC MUTE from 01 to 00 (disabling digital convergence).
6. Set VIDEO "C_OFF" DAC from 01 to 00.

HD 1080i Horizontal size adjustment (H WID)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

This adjustment is intended to adjust horizontal size of the picture.

1. Apply a HD 1080i pattern.
2. Repeat NTSC horizontal size adjustment from step 2.

Convergence adjustment

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

Note: It is strongly recommended to first read and understand the following section prior to make any adjustment.
Convergence adjustment must be performed for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i.

Turn PTV on and allow it to warm up for 30 minutes prior to making adjustments (WHITE PATTERN).

Note: This PTV uses the scheme described below to correct for misconvergence of the three CRT projection tubes. There are various modes to this operation.

Preparation:

Place the convergence alignment template (see "Convergence alignment template" on page 33) over the PTV screen. Align the center lines of the template with the mechanical center markers on the PTV screen

frame. If the template is not available, create one using the dimensions provided in "Convergence alignment template" on page 33.

Remote control must be used during the procedure.

Note: Apply the convergence alignment template to the PTV screen frame to converge the **green raster only**. Remove the convergence alignment template following this alignment. The red and blue rasters can then be aligned to the green raster.

Raster Setup:

1. Enter to service mode (red CHK).
2. In SET-UP (roller guide menu) CONVERGENCE 1 set all values to 0.
3. Cover red & blue lens with caps.
4. Apply a pattern to adjust specific format:
 - **NTSC signal to adjust 480i-p (same for interlace and progressive)**
 - **1080i signal to adjust 1080i**
 - **480i signal with PTV in ZOOM aspect to adjust Z480i**
5. Select DAC COARSE, then press ACTION to enter to "CONVERGENCE ADJ" mode.
6. Press "0" key on remote.
7. Press ACTION key on remote to enter to "TEST_POS" mode.
8. Move pattern by pressing VOL right - left and CH up - down so that the cursor center overlap monoscope pattern center.

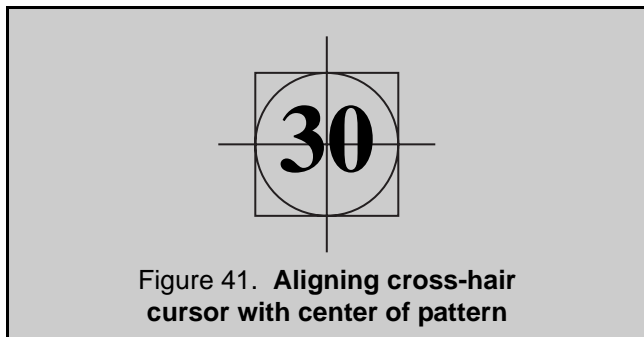


Figure 41. Aligning cross-hair cursor with center of pattern

9. Press "5" key on remote to exit superimpose mode (monoscope pattern disappear).
10. Press "TV/VIDEO" key to enter "DATA_POS" mode
11. Adjust by pressing VOL right - left so that peak of curve is the same position as center of cursor.

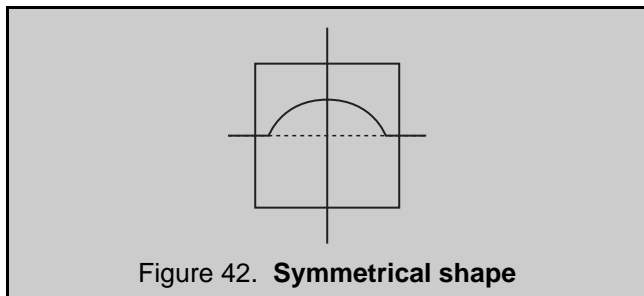


Figure 42. Symmetrical shape

12. Press "TV/VIDEO" key on remote to enter "OSD_POS" mode.

13. Press "5" key on remote so that monoscope pattern appears (superimpose mode)
14. Move cursor by pressing VOL right - left and CH up - down so that cursor center overlap monoscope pattern center
15. Press "0" key to go back to "CONVERGENCE ADJ" mode.
16. Press "TV/VIDEO" key to cycle through "COARSE ADJ. MODE" options.

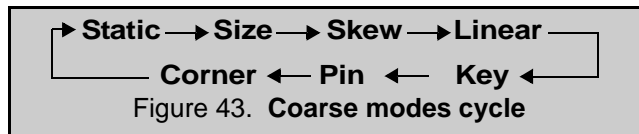


Figure 43. Coarse modes cycle

17. To change to "FINE ADJUSTMENT MODE" options (DAC FINE), press "TV/VIDEO" key on remote for at least 3 seconds, to go back to "COARSE ADJ MODE" options press "TV/VIDEO" on remote again for 3 seconds.
18. In "FINE ADJUSTMENT MODE" options, press "MUTE" key on remote to switch between "cursor" mode and "data" mode.
 - **Cursor mode:** Allows cursor movement by pressing VOL right - left and CH up - down.
 - **Data mode:** Allows making adjustment by pressing VOL right - left and CH up - down.
19. Either "COARSE ADJUSTMENT MODE" options or "FINE ADJUSTMENT MODE" options, press "R-TUNE" repeatedly key on remote to cycle through different color adjustments (R, G, B, White)
20. To store adjustments press "7", then "ACTION" key on remote, otherwise press "POWER" then "ACTION" to exit adjustments without saving.
21. Remote functions:
 - 1, 3..... change color view adj
 - 2..... change pattern
 - 7..... save data
 - 5..... overlap
 - POWER..... to exit
 - RECALL..... display values
 - R-TUNE..... cycle colors
 - TV/VIDEO..... change mode
 - 3 secs..... change options

Coarse adjustment mode (COARSE)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

Note: It is strongly recommended to first read and understand the following section prior to make any adjustment. Convergence adjustment must be perform for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i.

Procedure:

1. Enter to "G-SIZE" mode:
 - **DAC COARSE**
 - **Press ACTION on remote**
 - **TV/VIDEO (repeatedly)**
 - **R-TUNE (repeatedly)**

2. Press "2" repeatedly and apply the pattern of border and cross.
3. Press RECALL to display values
4. Adjust size so that the line of the border closes to the screen frame at top, bottom, left and right by pressing CH up-down and VOL right-left.

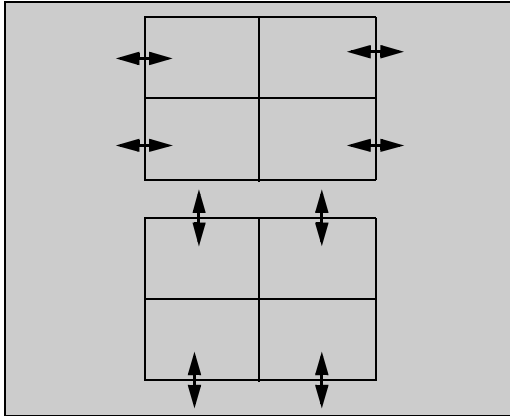


Figure 44. **H & V size adjustment**

5. Press "7" then "ACTION" key on remote to save changes.
6. Enter to linearity "G-LINEAR" mode by pressing "TV/VIDEO".
7. Adjust linearity by pressing VOL right-left until A=B (see figure 45)

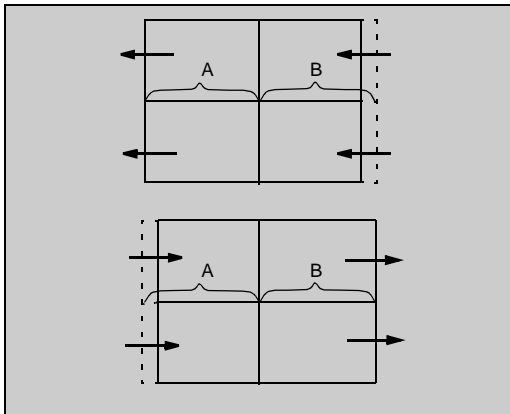


Figure 45. **Linear mode adjustment**

8. Press "7" then "ACTION" key on remote to save changes.
9. Enter to PIN "G-PIN" mode by pressing "TV/VIDEO".
10. Adjust V_PIN by pressing CH up-down (see figure 46).
11. Adjust H_PIN by pressing VOL right-left.

12. Press "7" then "ACTION" key on remote to save changes.

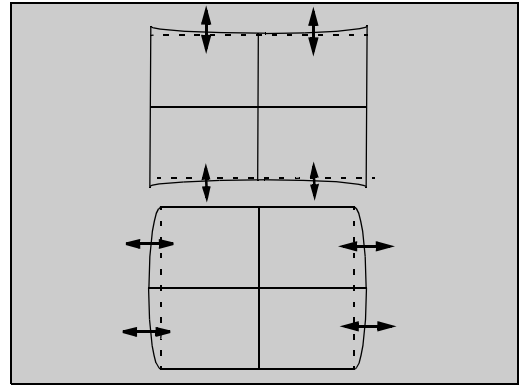


Figure 46. **H & V PIN adjustment**

13. Enter to CORNER "G-CORNER" mode by pressing TV/VIDEO.
14. Adjust by pressing VOL right-left (see figure 47).
15. Press "7" then "ACTION" key on remote to save changes.

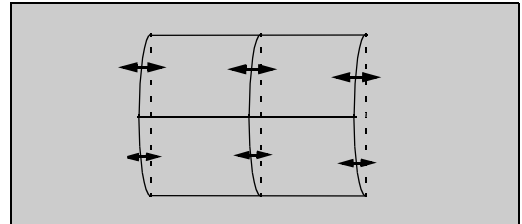


Figure 47. **Corner adjustment**

16. Enter to KEY "G-KEY" mode by pressing TV/VIDEO.
17. Adjust by pressing CH up-down (see figure 48)
18. Press "7" then "ACTION" key on remote to save changes

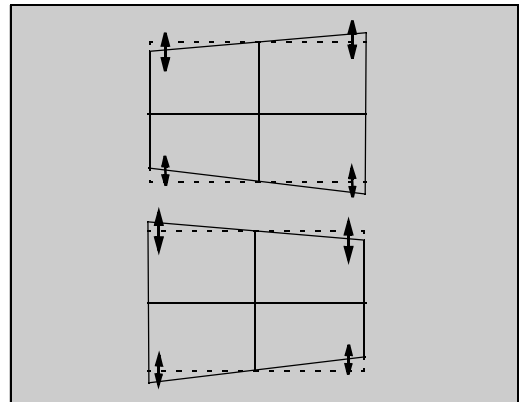


Figure 48. **KEY mode adjustment**

Note: Confirm that pattern looks like a square and almost overlaps the screen frame, check that vertical and horizontal line center match with the marks on screen frame, if linearity is not good enough, repeat adjustments.

19. Enter to "STATIC" mode by pressing TV/VIDEO.
20. Press "1" or "3" repeatedly until green and red only are shown.

21. Adjust "R-STATIC" so that the center of red overlaps with the center of green.

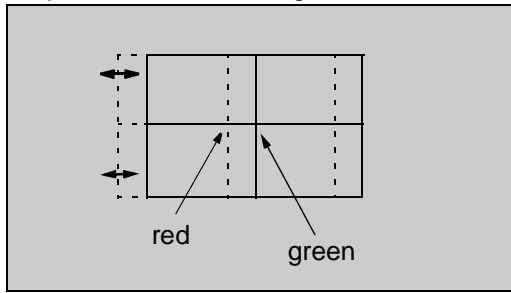


Figure 49. **STATIC mode adjustment**

22. Enter to SKEW "R-SKEW" mode by pressing TV/VIDEO
23. Adjust "R-SKEW" so that the vertical and horizontal line of center overlaps with green (see figure 50)
24. Press "7" then "ACTION" key on remote to save changes.

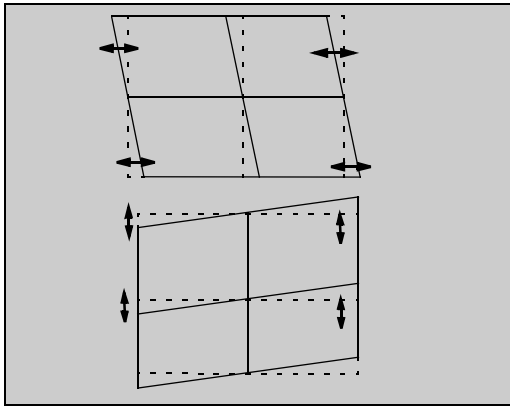


Figure 50. **SKEW adjustment**

Note: Remember always save data following each adjustment by pressing "7" key on remote, then ACTION.

25. Enter to LINEARITY "R-LINEAR" mode by pressing TV/VIDEO.
26. Adjust Horizontal linearity (see figure 45)
27. Enter to SIZE "R-SIZE" mode by pressing TV/VIDEO
28. Adjust so that the line on the border closes to the screen frame at top, bottom, left and right (see figure 44)
29. Enter to PIN "R-PIN" mode by pressing TV/VIDEO
30. Adjust horizontally and vertically (see figure 46)
31. Enter to CORNER "R-CORNER" mode by pressing TV/VIDEO.
32. Adjust corners (see figure 47)
33. Enter to KEY "R-KEY" mode by pressing TV/VIDEO
34. Adjust KEY (see figure 48)
35. Display pattern of border and cross, then check that red overlaps green pattern, if it is not satisfactory, repeat from step 19.
36. Enter to STATIC "B-STATIC" mode.
37. Press "1 or 3" key repeatedly on remote until only green and blue pattern are displayed

38. Adjust B-STATIC so that the center of blue overlaps with the center of green (see figure 51).

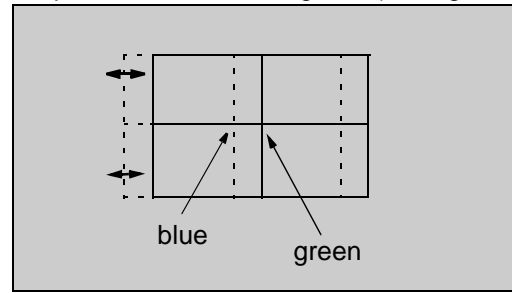


Figure 51. **B-STATIC adjustment**

39. Perform all adjustments for blue (B-SKEW, B-LINEAR, B-SIZE, B-PIN, B-CORNER, B-KEY)
40. Display border and cross pattern and confirm that blue overlaps with green pattern, if it is not satisfactory, repeat for blue.
41. Press "1 or 3" key repeatedly on remote until green, red and blue (white), confirm that red and blue overlaps with green pattern.
42. Press "7" key on remote, then ACTION to save changes.
43. Press POWER then ACTION to exit adjustments or press TV/VIDEO for at least 3 seconds to change to Fine Adjustment Mode.

Fine adjustment mode (FINE) (convergence)

Note: It is strongly recommended to first read and understand the following section prior to make any adjustment.
Convergence adjustment must be performed for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i.

Helpful hint:

The easiest way to adjust convergence is to begin from the center of the screen, to the border in all the convergence adjustments.

Remote functions:

- 1, 3. change color view adj
- 2. change pattern
- 7. save data
- 5. overlap
- POWER. to exit
- RECALL. display values
- R-TUNE. cycle colors
- TV/VIDEO change mode
- 3 secs. change options
- MUTE ("fine"). cursor & data mode

About pattern:

- NTSC to adjust 480ip (same for interlace and progressive)
- 1080i to adjust 1080i
- 480i with ptv in zoom aspect to adjust Z480i

In "FINE ADJUSTMENT MODE" options, press "MUTE" key on remote to switch between "cursor" mode and "data" mode.

- Cursor mode (cursor flashing): Allows cursor movement by pressing VOL right - left and CH up - down.
- Data mode (cursor fixed): Allows making adjustment by pressing VOL right - left and CH up - down.

Procedure:

1. Enter to "G-EASY" mode (for green):
 - DAC EASY
 - Press POWER on remote
 - TV/VIDEO (repeatedly)
 - R-TUNE (repeatedly)
2. Press "2" repeatedly and apply the pattern of crosshatch.
3. Press "1 or 3" repeatedly until the pattern becomes green.
4. Press RECALL to display values.
5. In "EASY" mode, the adjustment value changes by 4 steps
6. EASY mode allows to move lines horizontally and vertically from the center of cursor.

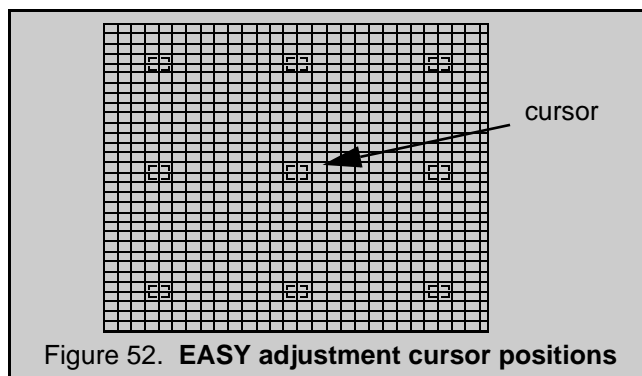


Figure 52. **EASY adjustment cursor positions**

7. This mode affects a wide area around the cursor than other adjustment modes, See values on screen by pressing RECALL on remote (see figure 53)
8. Begin adjustment from the center to the edge of the screen.
9. Adjust by pressing CH up/down and VOL right/left on the remote control when the cursor is not flashing, if the cursor is flashing press MUTE on the remote.

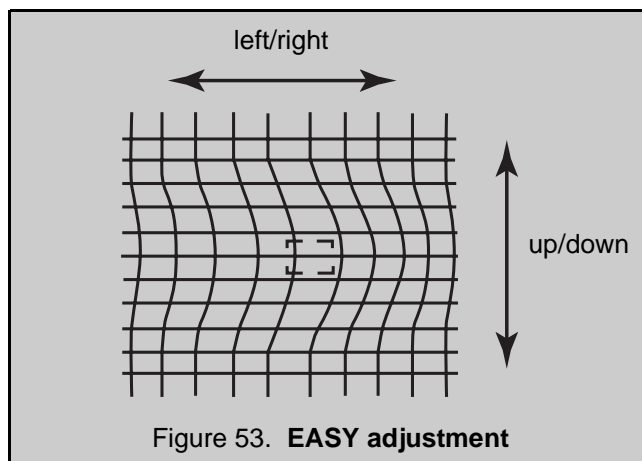


Figure 53. **EASY adjustment**

10. To move the cursor press MUTE on the remote (cursor flashes), then move the cursor to any of the 9 positions for "EASY" mode(see figure 52)
11. This adjustment may help to make rounded lines become straight lines
12. Adjust to make lines as straight as possible
13. Enter to POINT "G-POINT" (for green) mode by pressing TV/VIDEO.
14. "POINT" mode allows to move line horizontally and vertically from the perimeter of cursor making rounded lines become straight (see figure 54)
15. In "POINT" mode, the adjustment data changes by 2 steps, See values on screen by pressing RECALL on remote.

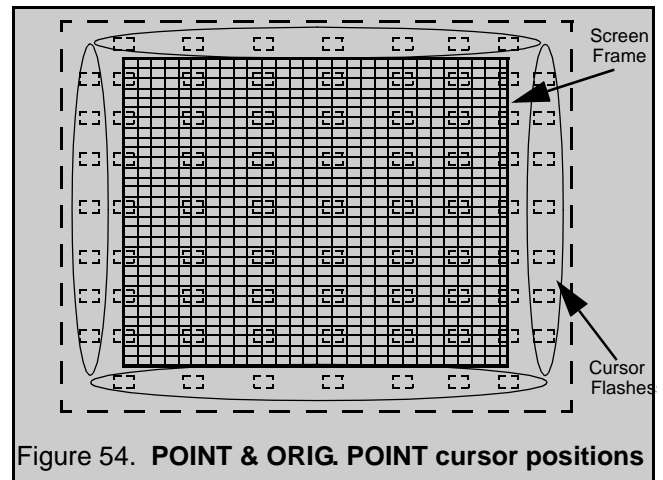


Figure 54. **POINT & ORIG. POINT cursor positions**

16. When the cursor is located in the outer area of the border the cursor starts to flash from one side to other and the adjustment is for the non-visible area (inside the ovals area, see figure 54); This applies to "LINE", "POINT" & "ORIG. POINT" modes.
17. Begin adjustment from the center to the edge of the screen.

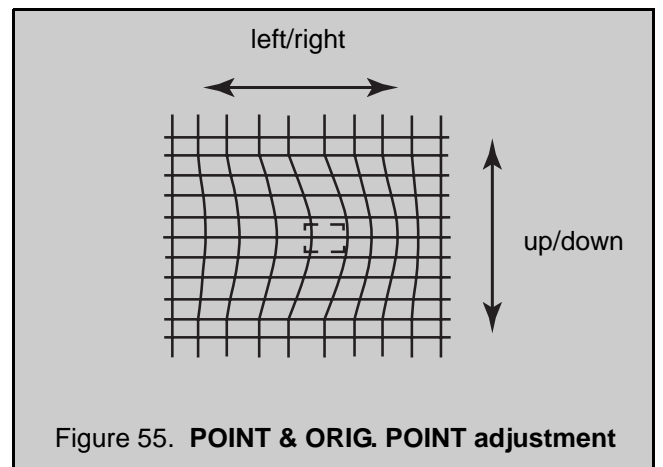


Figure 55. **POINT & ORIG. POINT adjustment**

18. Adjust to make lines as much straight as possible
19. When slightly adjustment is needed, use "ORIG. POINT" mode.
20. To enter to "G-ORIG. POINT" (for green) mode press TV/VIDEO.
21. With "ORIG. POINT", the adjustment data changes by 1 step, this allows more detail in the adjustment. Display values on screen by pressing RECALL on remote

22. Confirm that green adjustment is good enough, if adjustment is not satisfactory, repeat adjustments.
23. Enter to LINE "G-LINE" mode by pressing TV/VIDEO.
24. LINE mode allows to move each single line horizontally and vertically (see figure 57).
25. Begin adjustment from the center to the edge of the screen (see figure 56)
26. Adjust to make distribute lines

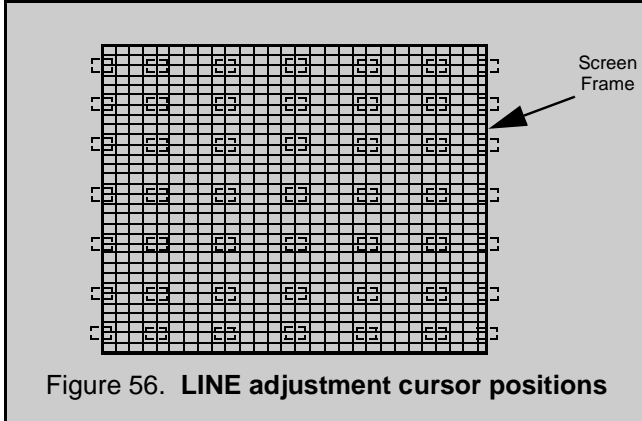


Figure 56. LINE adjustment cursor positions

27. Then press "1 or 3" on the remote until red and green appears.

Note: Since convergence adjustment will not allows to adjust every single cross section of the grid, it is very important to adjust, so that overall looks best.

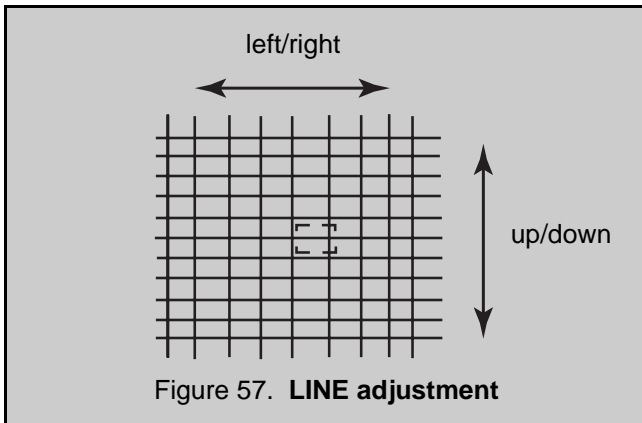


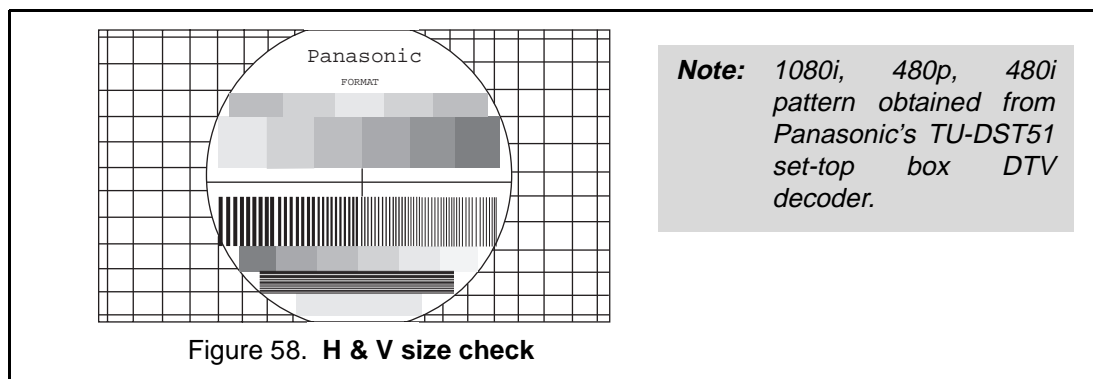
Figure 57. LINE adjustment

28. Perform adjustments for red so that red overlaps green, do not move green.
29. Press "1 or 3" on the remote until yellow (red and green) and blue appears, do not move green or red.
30. Perform adjustments so that blue overlaps Yellow (red and green).
31. Press "1 or 3" key on remote to display red, green and blue (white).
32. At this point the crosshatch pattern should look white
33. If the crosshatch pattern is not only white, repeat adjustment for that color (red or blue)

34. Once the crosshatch pattern looks only white, perform the adjustments for White ("POINT", "ORIG. POINT" & "LINE"), notice that each adjustment is only for white (red, green, blue)
35. Adjust white for a good line distribution and make lines completely straight.
36. Press "7" key on remote, then ACTION to save changes.
37. Press POWER then ACTION to exit convergence adjustments (DACs menu appears).

Horizontal and vertical size check

1. Apply a pattern that permits to check that horizontal and vertical proportion of the image is correct.



2. Confirm that horizontal and vertical center of the picture is located in the center of the screen.
3. Check that the image is proportional horizontally and vertically, proportion is different on every aspect.

Convergence alignment template

The **convergence alignment template** is a grid approximately the size of the viewing screen used to ensure the proper size and shape of the alignment rasters. It is 6 blocks across by 6 blocks high. The grid dimensions vary with the mode of operation.

Apply a **convergence alignment template** to the viewing screen of the PTV. Make sure the center lines are properly aligned. If a template is not available, one can be created by following the instructions below.

Create a convergence alignment template by drawing a pattern, as in figure 59, in the actual dimensions on transparent film or tracing paper. Start with the Horizontal and Vertical Center Axis and work outwards until the pattern is complete. Pay attention to the actual dimensions of the pattern.

Grid dimensions:

47" Models: 1036mm horizontal X 584mm vertical.

Note: A convergence alignment template, part number **TXFQD01ESER1** for 47", is available through Matsushita/Panasonic Services.

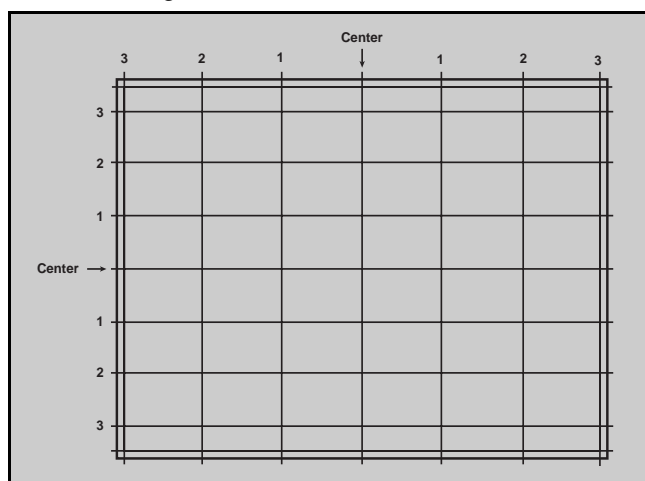


Figure 59. Convergence adjustment grid

Service mode (electronic controls)

This receiver has electronic technology using the I²C bus concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using "on screen display menu". (The **service adjustment mode**.)

Note: It is suggested that the technician reads all the way through and understand the following procedure for entering/exiting the **service adjustment mode**; then proceed with the instructions working with the receiver. When becoming familiar with the procedure, the flow chart for service mode may be used as a quick guide.

Quick entry to service mode:

When minor adjustments need to be done to the electronic controls, the method of entering the service mode without removal of the cabinet back is as follows using the remote control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press "ACTION" twice to exit menus.
4. Tune to the Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press VOL ◀ (decrease) **on receiver**. Red "CHK" appears in upper corner.

Note: After receiver is set into SERVICE MODE, set TIMER back to NO.

To toggle between aging and service modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing "ACTION" and "VOL" UP on the TV simultaneously will toggle between the modes. Red "CHK" for service mode and yellow "CHK" for Aging.

7. Press **POWER** on the **remote control** to display the service adjustment modes menu, select adjustment by pressing the VOL right/left buttons and CH up/down buttons on the remote and ACTION to enter the adjustment.

MODE	480i 4:3	480P 16:9	1080i DW	HX WX
MTS	MTSIN	SEPAL	SEPAH	
CLOCK	CLOCK			
VIDEO	COLOR	B-Y_G	TINT	R-Y_A
	BRIGHT	CONT	CUT R	CUT B
	R DR	B DR	I-ABL	C OFF
HDEF	H POS	H WID	PCC	EWCOR
	EWTRA	H CORR		
VDEF	V SIZE	VLIN	V-S	V-I
	VSIM	VCORR		
CONV	MUTE	COARS	FINE	
DAF	H-PAR	V-SAW	V-PAR	
OTHER	ACL	HHS	W-POS	LIMIT

Figure 60. Service mode menu adjustments.

Note: Some adjustments are available only in some modes (480i, 480p, 1080i); it is needed to apply the format; For some adjustments is required to perform adjustment for each format; convergence adjustment must be performed for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i. A 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

Exiting the service mode:

This PTV goes out from service mode when it is unplugged or turned OFF. To exit the service mode, turn the TV OFF or unplug the PTV from AC.

Other method

Press **ACTION** and **POWER** on the **receiver** simultaneously for at least 2 seconds.

The receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.

Any programmed channels, channels caption data and some others user defined settings will be erased when exited by pressing ACTION and POWER on receiver.

IMPORTANT NOTE:
Always check that the PTV exits the service mode.

To check colors:

Press **RECALL** on the **remote control** when in service mode (red "CHK" is displayed) to enter the purity field check mode.

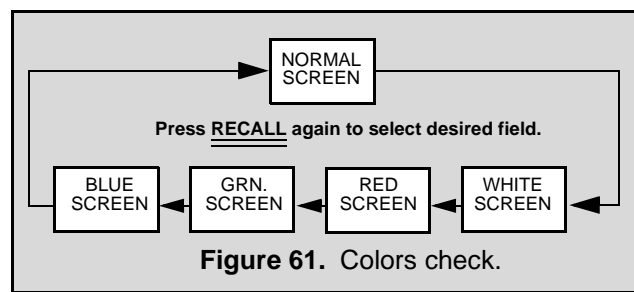


Figure 61. Colors check.

Table of the service adjustment item available for each format

Signal Formated		Format		
		480i	480p	1080i
	MTS			
<i>MTSIN</i>	<i>INPUT LEVEL</i>	X	N/A	N/A
<i>SEPAL</i>	LOW LEVEL SEPARATION	X	N/A	N/A
<i>SEPAH</i>	HIGH LEVEL SEPARATION	X	N/A	N/A
	CLOCK			
<i>CLOCK</i>	<i>CLOCK</i>	X	N/A	N/A
	VIDEO			
<i>COLOR</i>	<i>COLOR</i>	X	N/A	X
<i>TINT</i>	TINT	X	N/A	X
<i>BRIGHT</i>	<i>SUB-BRIGHTNESS</i>	X	N/A	X
<i>CONT</i>	<i>SUB-CONTRAST</i>	X	N/A	X
<i>B-G_Y</i>	<i>MAGENTA TINT ADJ</i>	X	N/A	X
<i>R-Y_A</i>	<i>YELLOW TINT ADJ</i>	X	N/A	X
<i>CUT-R</i>	<i>RED CUT-OFF</i>	X	N/A	X
<i>CUT-B</i>	<i>BLUE CUT-OFF</i>	X	N/A	X
<i>R DR</i>	<i>RED DRIVE</i>	X	N/A	X
<i>B DR</i>	<i>BLUE DRIVE</i>	X	N/A	X
<i>I ABL</i>	<i>ABL</i>	X	X	X
<i>C_OFF</i>	<i>COLOR ADJ. CUT-OFF</i>	X	X	X
	HDEF			
<i>H POS</i>	<i>HORIZONTAL POSITIONING</i>	X	N/A	X
<i>HWID</i>	<i>HORIZONTAL WIDTH</i>	X	N/A	X
<i>PCC</i>	<i>PINCUSHION CORRECTION</i>	X	N/A	X
<i>EWCOR</i>	<i>CORNER CORRECTION</i>	X	N/A	X
<i>EWTRA</i>	<i>TRAPEZOID</i>	X	N/A	X
<i>HCORR</i>	<i>HORIZONTAL CORRECTION</i>	X	N/A	X
	VDEF			
<i>VSIZE</i>	<i>VERTICAL SIZE</i>	X	N/A	X
<i>VLIN</i>	<i>VERTICAL LINEARITY</i>	X	N/A	X
<i>V-S</i>	<i>VERTICAL S CORRECTION</i>	X	N/A	X
<i>V-I</i>	<i>VERTICAL ENDING CORRECTION</i>	X	N/A	X
<i>VSYM</i>	<i>VERTICAL MAGNET CORRECTION</i>	X	N/A	X

Signal Formated		Format		
		480i	480p	1080i
VCORR	VERTICAL CORRECTION	X	N/A	X
	CONV			
MUTE	DIGITAL CONV (ON/OFF)	X	X	X
COARS	COARSE ADJUSTMENT	X	X	X
FINE	FINE ADJUSTMENT	X	X	X
	DAF			
H-PAR	HORIZONTAL PARABOLA	X	X	X
V-SAW	VERTICAL SAW	X	X	X
V-PAR	VERTICAL PARABOLA	X	X	X
	OTHER			
ACL	-----	X	N/A	X
HHS	-----	X	N/A	X

Note: PTV detects automatically the format of the input signal (480i, 480p or 1080i)

480i Service mode (electronic controls, continued)

Note: Registers marked as **FIXED** are factory preset, the default value must not be changed

Important note:

Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section.)

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀▶ buttons on the remote control to adjust the level of the selected service adjustments.

MTS Adjustments	Description	Default Level	New Level
MTSIN	INPUT LEVEL	21	
SEPAL	LOW LEVEL SEPARATION	06	
SEPAH	HIGH LEVEL SEPARATION	1A	
CLOCK Adjustments	Description	Default Level	New Level
CLOCK	CLOCK	128	
VIDEO Adjustments	Description	Default Level	New Level
COLOR	COLOR	13	
TINT	TINT	80	
BRIGHT	SUB-BRIGHTNESS	01 DB	
CONT	SUB-CONTRAST	89	
B-Y_G	MAGENTA TINT ADJ	40	
R-Y_A	YELLOW TINT ADJ	80	
CUT R	RED CUT-OFF	01 FB	
CUT B	BLUE CUT-OFF	01 EC	
R DR	RED DRIVE	57	
B DR	BLUE DRIVE	70	
I ABL	ABL	VARIABLE	
C_OFF	COLOR ADJ. CUT-OFF	00	
HDEF Adjustments	Description	Default Level	New Level
H POS	HORIZONTAL POSITIONING	01 48	
H WID	HORIZONTAL WIDTH	1D	
PCC	PINCUSHION CORRECTION	20	
EWCOR	CORNER CORRECTION	03	
EWTRA	TRAPEZOID	08	
HCORR	HORIZONTAL CORRECTION	0D	

Note: Registers marked as **FIXED** are factory preset, the default value must not be changed

Important note:

Write down the original values (“b” in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section).

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. (“a” in figure 60)

b. Press

The ◀▶ buttons on the remote control to adjust the level of the selected service adjustments.

VDEF Adjustment	Description	Default Level	New Level
VSIZE	VERTICAL SIZE	00	
VLIN	VERTICAL LINEARITY	10	
V-S	VERTICAL S CORRECTION	0A	
V-I	VERTICAL ENDING CORRECTION	0F (DEFAULT)	
VSYM	VERTICAL MAGNET CORRECTION	04 (DEFAULT)	
VCORR	VERTICAL CORRECTION	0C	
CONV Adjustments	Description	Default Level	New Level
MUTE	DIGITAL CONV (ON/OFF)	00	
COARS	COARSE ADJUSTMENT	ADJUSTMENT	
FINE	FINE ADJUSTMENT	ADJUSTMENT	
DAF Adjustments	Description	Default Level	New Level
H-PAR	HORIZONTAL PARABOLA	+317	
V-SAW	VERTICAL SAW	-23	
V-PAR	VERTICAL PARABOLA	+69	
OTHER Adjustments	Description	Default Level	New Level
ACL	-----	01 CO	
HHS	-----	01 CO	

About format aspect switching (WX 16:9 or HX 4:3):

Widescreen 16:9 and non-widescreen 4:3 PTVs use the same light box, for this reason is important to set it to the correct version (16:9 or 4:3). To change the format please refer to figure 62 on page 43.
Be sure to select the correct format for the serviced PTV.

480p Service mode (electronic controls, continued)

Note: Registers marked as **FIXED** are factory preset, the default value must not be changed

Important note:

Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section.)

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀▶ buttons on the remote control to adjust the level of the selected service adjustments.

MTS Adjustments	Description	Default Level	New Level
MTSIN	INPUT LEVEL	N/A	
SEPAL	LOW LEVEL SEPARATION	N/A	
SEPAH	HIGH LEVEL SEPARATION	N/A	
CLOCK Adjustments	Description	Default Level	New Level
CLOCK	CLOCK	N/A	
VIDEO Adjustments	Description	Default Level	New Level
COLOR	COLOR	N/A	
TINT	TINT	N/A	
BRIGHT	SUB-BRIGHTNESS	N/A	
CONT	SUB-CONTRAST	N/A	
B-Y_G	MAGENTA TINT ADJ	N/A	
R-Y_A	YELLOW TINT ADJ	N/A	
CUT R	RED CUT-OFF	N/A	
CUT B	BLUE CUT-OFF	N/A	
R DR	RED DRIVE	N/A	
B DR	BLUE DRIVE	N/A	
I ABL	ABL	VARIABLE	
C_OFF	COLOR ADJ. CUT-OFF	00	
HDEF Adjustments	Description	Default Level	New Level
H POS	HORIZONTAL POSITIONING	N/A	
H WID	HORIZONTAL WIDTH	N/A	
PCC	PINCUSHION CORRECTION	N/A	
EWCOR	CORNER CORRECTION	N/A	
EWTRA	TRAPEZOID	N/A	
HCORR	HORIZONTAL CORRECTION	N/A	

Note: Registers marked as **FIXED** are factory preset, the default value must not be changed

Important note:

Write down the original values (“b” in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section).

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. (“a” in figure 60)

b. Press

The ◀▶ buttons on the remote control to adjust the level of the selected service adjustments.

VDEF Adjustment	Description	Default Level	New Level
VSIZE	VERTICAL SIZE	N/A	
VLIN	VERTICAL LINEARITY	N/A	
V-S	VERTICAL S CORRECTION	N/A	
V-I	VERTICAL ENDING CORRECTION	N/A	
VSYM	VERTICAL MAGNET CORRECTION	N/A	
VCORR	VERTICAL CORRECTION	N/A	
CONV Adjustments	Description	Default Level	New Level
MUTE	DIGITAL CONV (ON/OFF)	00	
COARS	COARSE ADJUSTMENT	ADJUSTMENT	
FINE	FINE ADJUSTMENT	ADJUSTMENT	
DAF Adjustments	Description	Default Level	New Level
H-PAR	HORIZONTAL PARABOLA	+317	
V-SAW	VERTICAL SAW	-23	
V-PAR	VERTICAL PARABOLA	+69	
OTHER Adjustments	Description	Default Level	New Level
ACL	-----	01 CO	
HHS	-----	01 CO	

About format aspect switching (WX 16:9 or HX 4:3):

Widescreen 16:9 and non-widescreen 4:3 PTVs use the same light box, for this reason is important to set it to the correct version (16:9 or 4:3). To change the format please refer to figure 62 on page 43.

Be sure to select the correct format for the serviced PTV.

1080i Service mode (electronic controls, continued)

Note: Registers marked as **FIXED** are factory preset, the default value must not be changed

Important note:

Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section.)

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀▶ buttons on the remote control to adjust the level of the selected service adjustments.

MTS Adjustments	Description	Default Level	New Level
MTSIN	INPUT LEVEL	N/A	
SEPAL	LOW LEVEL SEPARATION	N/A	
SEPAH	HIGH LEVEL SEPARATION	N/A	
CLOCK Adjustments	Description	Default Level	New Level
CLOCK	CLOCK	N/A	
VIDEO Adjustments	Description	Default Level	New Level
COLOR	COLOR	1C	
TINT	TINT	80	
BRIGHT	SUB-BRIGHTNESS	02 00	
CONT	SUB-CONTRAST	89	
B-Y_G	MAGENTA TINT ADJ	40	
R-Y_A	YELLOW TINT ADJ	80	
CUT R	RED CUT-OFF	01 FB	
CUT B	BLUE CUT-OFF	01 EC	
R DR	RED DRIVE	57	
B DR	BLUE DRIVE	70	
I ABL	ABL	00	
C_OFF	COLOR ADJ. CUT-OFF	00	
HDEF Adjustments	Description	Default Level	New Level
H POS	HORIZONTAL POSITIONING	00 C2	
H WID	HORIZONTAL WIDTH	2B	
PCC	PINCUSHION CORRECTION	0C	
EWCOR	CORNER CORRECTION	03	
EWTRA	TRAPEZOID	08	
HCORR	HORIZONTAL CORRECTION	0E	

Note: Registers marked as **FIXED** are factory preset, the default value must not be changed

Important note:

Write down the original values (“b” in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section).

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. (“a” in figure 60)

b. Press

The ◀▶ buttons on the remote control to adjust the level of the selected service adjustments.

VDEF Adjustment	Description	Default Level	New Level
VSIZE	VERTICAL SIZE	40	
VLIN	VERTICAL LINEARITY	15	
V-S	VERTICAL S CORRECTION	19	
V-I	VERTICAL ENDING CORRECTION	0F (DEFAULT)	
VSYM	VERTICAL MAGNET CORRECTION	04 (DEFAULT)	
VCORR	VERTICAL CORRECTION	0C	
CONV Adjustments	Description	Default Level	New Level
MUTE	DIGITAL CONV (ON/OFF)	00	
COARS	COARSE ADJUSTMENT	ADJUSTMENT	
FINE	FINE ADJUSTMENT	ADJUSTMENT	
DAF Adjustments	Description	Default Level	New Level
H-PAR	HORIZONTAL PARABOLA	+263	
V-SAW	VERTICAL SAW	-35	
V-PAR	VERTICAL PARABOLA	+117	
OTHER Adjustments	Description	Default Level	New Level
ACL	-----	01 CO	
HHS	-----	01 CO	

About format aspect switching (WX 16:9 or HX 4:3):

Widescreen 16:9 and non-widescreen 4:3 PTVs use the same light box, for this reason is important to set it to the correct version (16:9 or 4:3). To change the format please refer to figure 62 on page 43.

Be sure to select the correct format for the serviced PTV.

Instructional flow chart for format aspect switching (WX 16:9 or HX 4:3)

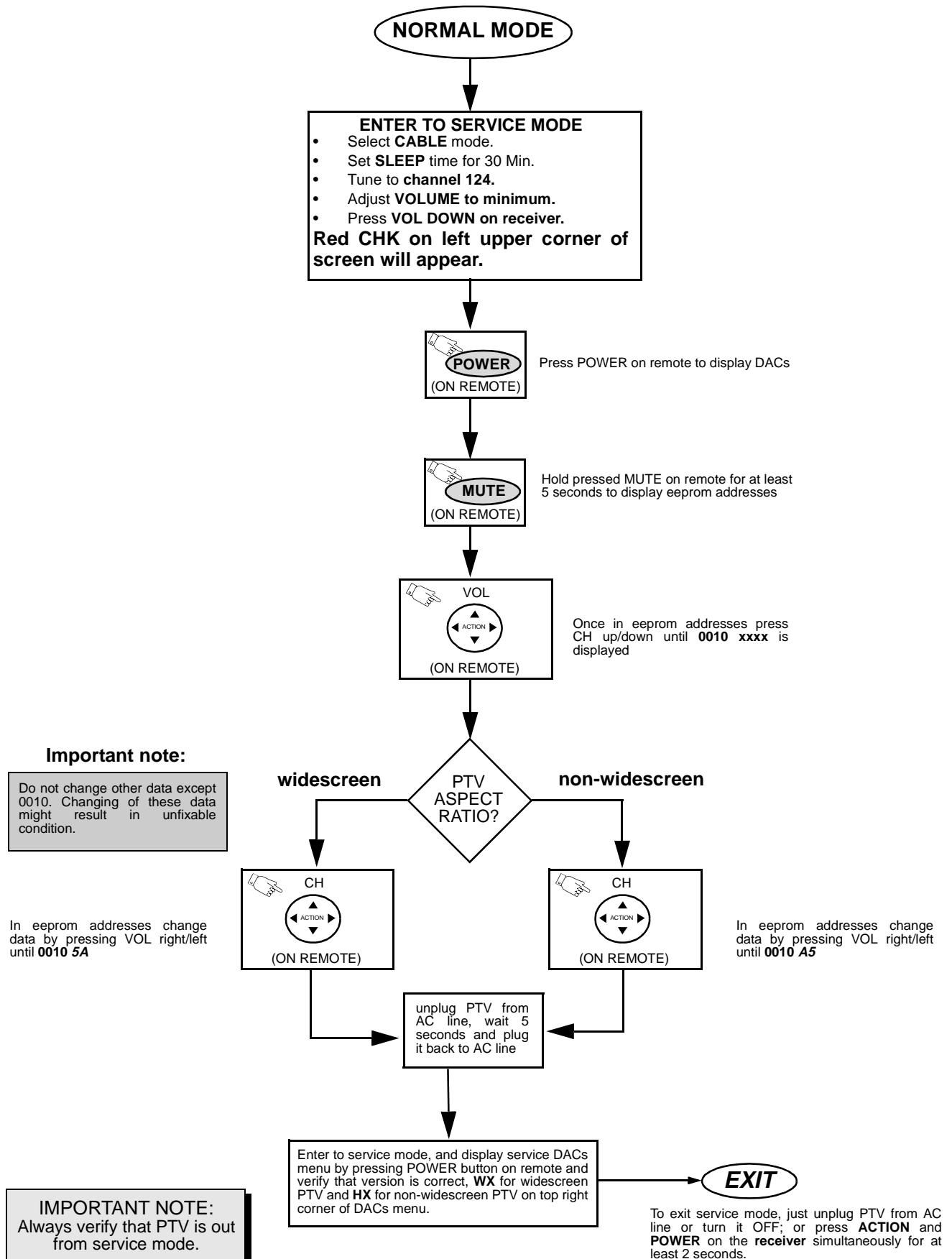


Figure 62. Flow chart for aspect ratio switching.

Instructional flow chart for service mode

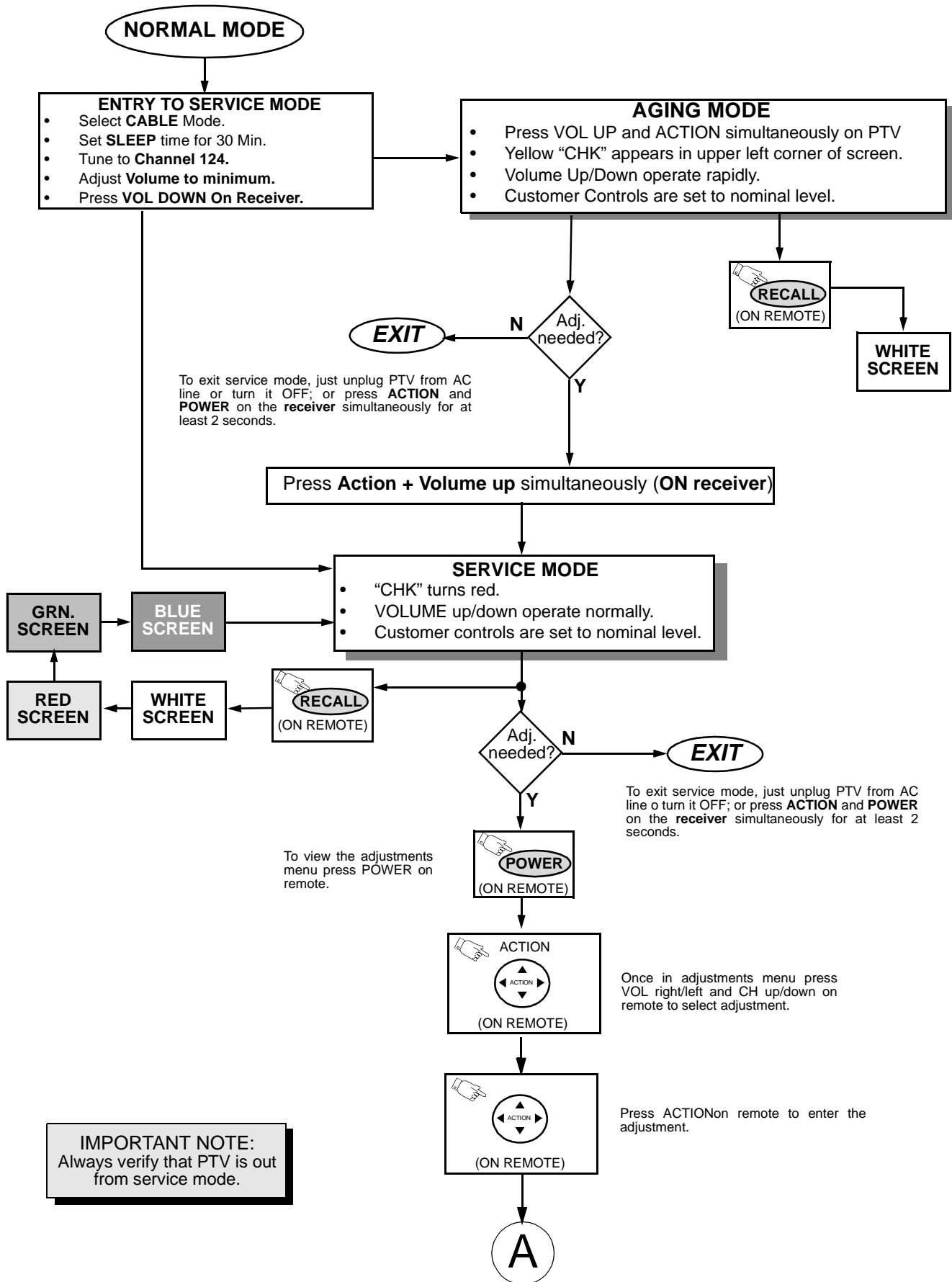
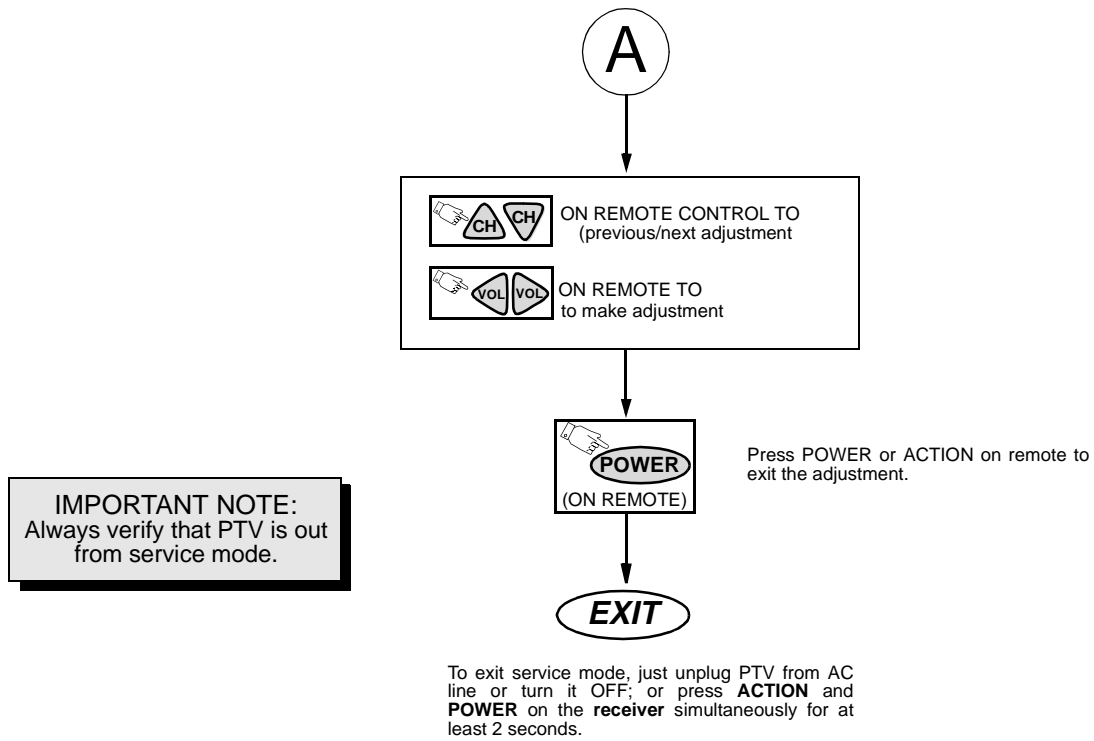


Figure 63. Flow chart for service mode.

Instructional flow chart for service mode - continued



Flow chart for service mode (continued).

NTSC Sub-Bright adjustment (BRIGHT)

Procedure:

1. Set PIC MODE TO VIVID, PICTURE settings to normal, NATURAL COLOR to OFF and COLOR TEMPERATURE to NORMAL.
2. Connect meter (+) to TPD50 and (-) to TPD51.
3. Apply a NTSC color bar with no color or if available a grey levels pattern.
4. Adjust DAC BRIGHT data so that bar near to black bar becomes near black .
5. Apply a white pattern and put user bright control to max. and confirm reading on meter is $12.4 \pm 1_V$.

1080i Sub-Bright adjustment (BRIGHT)

Procedure:

1. Set same settings as NTSC adjustment
2. Apply a 1080i signal, and repeat adjustments as from step 2 in NTSC adjustment.
3. If pattern is not available, use a color signal in 1080i and adapt the adjustment to that available signal
4. Adjust DAC CONT so that black and white level are in good balance (white is white and black is black)

NTSC Color adjustment (TINT, B-Y_G, R-Y_A)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

This adjustment requires that the servicer use its skills in observing what a colorbar pattern should look like.

Preparation:

1. Set the following in the user picture menu as follows:

PIC MODE:VIVID

COLOR: center (31)

PICTURE: max (63)

BRIGHT: center (31)

SHARPNESS: min. (0)

TINT:(31)

NATURAL COLOR:OFF

COLOR TEMPERATURE:NORMAL

Procedure:

1. Apply a NTSC color bar pattern
2. Adjust DAC TINT so that the fourth bar from right to left becomes purple and good color balance.
3. If the adjustment is high, the bar will look pinkish, if it is low will look bluish.
4. Adjust B-Y_G so blue look natural, and the rest of the colors become in balance.
5. Adjust R-Y_A so red look natural, and rest of the colors become in balance.
6. Check that white bar is real white, no bluish or redish or tending to become grey.

1080i Color adjustment (TINT, B-Y_G, R-Y_A)

Note: 1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

1. Set same settings as NTSC adjustment
2. Apply a 1080i signal, and repeat adjustments as from step 2 in NTSC adjustment.
3. If pattern is not available, use a color signal in 1080i and adapt the adjustment to that available signal.

Service mode (electronic controls, continued)

Red, green & blue screen cutoff

1. Use either a no input signal condition or raster from the NTSC generator.
2. Observing the green tube directly or via a reflective surface, adjust the VR on focus pack for the green tube for minimum noise.
3. Adjust the noise level in the red and blue tubes to match the noise level in the green tube.

White balance adjustment

Note: 1080I, 480p, 480I pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.

Prior to this adjustment, perform sub-contrast adjustment. This adjustment requires that the service use skills in observing what a screen without color should look like (white picture).

1. Enter the service mode.
2. Apply a NTSC black and white pattern to one of the video inputs (see above note) color bar with no color.

High light white balance adjustment

1. Adjust DAC R_DR for red and B_DR for blue adjustments.
2. Make sure the screen is not blue or green. The screen should be white in the white area.
3. Check the black and white area for a black and white picture with even shades of gray and no color tint in the picture.

Low light white balance adjustment

1. Adjust DAC CUT_R for red and DAC CUT_B for blue.
2. Check the screen for even white in all areas, no color.
3. Check the black and white pattern for a black and white picture, even shades of gray and no color tint in the low light areas.
4. Repeat the High Light and Low Light White Balance again until the white balance tracks from high light to low light.

Tint and color check

Set picture mode to VIVID mode.

Again, the service ability to see color and the balance of color is important for these adjustments.

Tint check

1. In picture menu set PICTURE NORM to YES.
2. Apply color bars to the video input.
3. Magenta is composed of two colors, blue and red.
4. Check to see that magenta does not have too much blue or too much red.
5. Check cyan. Cyan is composed of blue and green. It should not have too much blue or green.
6. Use a test signal from a VCR or laser disk that has a pre-recorded close up of a signal that has good flesh tones.
7. The signal on the VCR or laser disk should look normal.

Color check

Using a clean RF or video signal, set the color level so that it does not saturate or appear harsh. Make sure that color is not set so that it appears dull and washed out. Look for natural colors, try to adjust the picture to appear as a normal photograph.

MTS circuit adjustments

Note: It is important to adjust the MTS circuit in the order shown below.

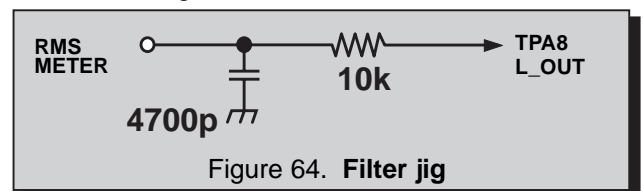
The MTS circuit adjustments require two steps:

1. Input level adjustment.
2. Stereo separation adjustment.

Input level adjustment (MTSIN)

Preparation:

1. Connect an RMS meter (AC range) with filter jig as shown in figure 64 .



2. Connect an RF signal generator to the RF antenna input.

Procedure:

1. Apply the following signal from the RF signal generator:
Video: 100 IRE flat field, 30% modulation.
Audio: 300Hz, 100% modulation, monaural (70 ± 5dB, 75Ω open, P/S 10dB). Make sure to turn off 75μs pre-emphasis.
2. Adjust DAC "MTSIN" MTS-INPUT data until the voltage measured is 106mV ± 6.0mV RMS.

Stereo separation adjustment (SEPAL & SEPAH)

Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect an oscilloscope probe to TPA7 (R_out).

Procedure:

1. Set PTV to Stereo Mode (in the audio menu).
2. Apply the following signal from the RF signal generator:
Video: 100 IRE flat field, 30% modulation.
Audio: 300Hz, 30% modulation, stereo (left only) (70dB ± 5dB, 75Ω OPEN, P/S 10dB).

Note: Set the 30% modulation with the pilot light SW and N.R. switches OFF then turn them ON while testing.

3. Adjust MTS low-level separation "SEPAL" DAC data (in the service menu) until the amplitude of the measured waveform on the scope is minimum.

4. Apply the following signal from the RF signal generator:
Video: 100 IRE flat field, 30% modulation.
Audio: 3KHz, 30% modulation, stereo (left only).
(70dB ± 5dB, 75Ω OPEN, P/S 10dB).

Note: Set the 30% modulation with the P.L and N.R. switches OFF then turn them ON while testing.

5. Adjust MTS High-Level Separation "SEPAH" DAC data until the amplitude of the waveform measured on the scope is minimum.
6. Repeat above steps 2 through 5 until the amplitude is at minimum for both signals.

Clock Adjustment (CLOCK)

Preparation:

Connect the frequency counter from IC001 MPU
Pin 10 or TPA009, to cold ground (⚡).

Note: Frequency Counter probe capacitance should be 8pF or less.

Procedure:

1. Turn the PTV "ON" with the AC power applied.
2. Measure TPA009 IC001 MPU pin 10 for frequency and record the reading.

Note: Pin 10 measurement must have at least four digits of resolution following the decimal point.
Example: 000.0000

3. Place the PTV into service mode for making electronic adjustment, select the clock adjustment DAC CLOCK and change value to 128.
4. Calculate and set CLOCK based on the following formula:

$$CLOCK = 128 + 0.450 \times 106 \times \frac{\{732.422 - pin(10)[Hz]\}}{732.4220}$$

Note: Pin 10 measurement will not change regardless of the value stored in CLOCK.

Audio signal path block diagram

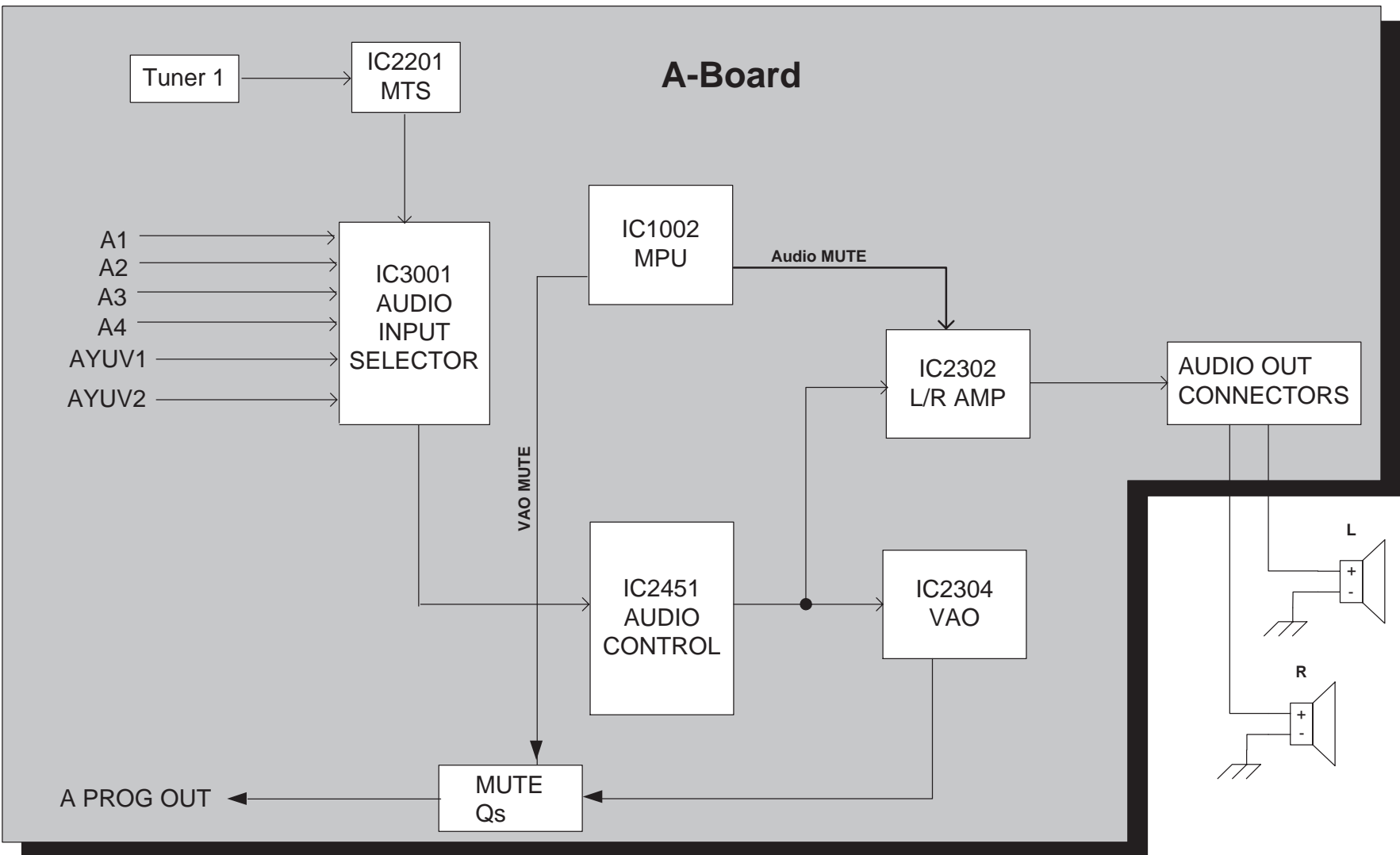
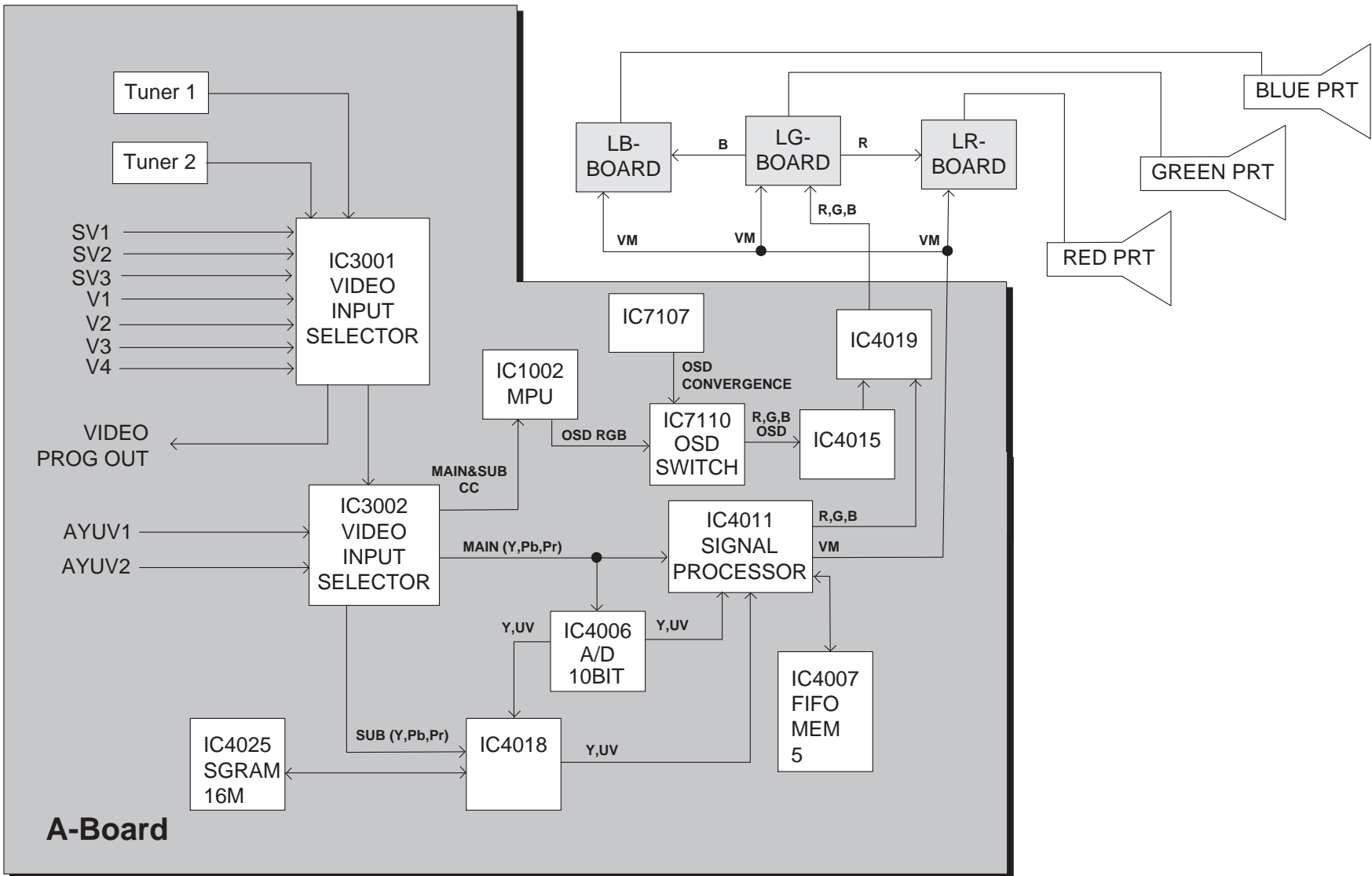


Figure 65. Audio signal path block diagram

Figure 66. Video-chroma signal path block diagram.



Video-chroma signal path block diagram

IIC connection

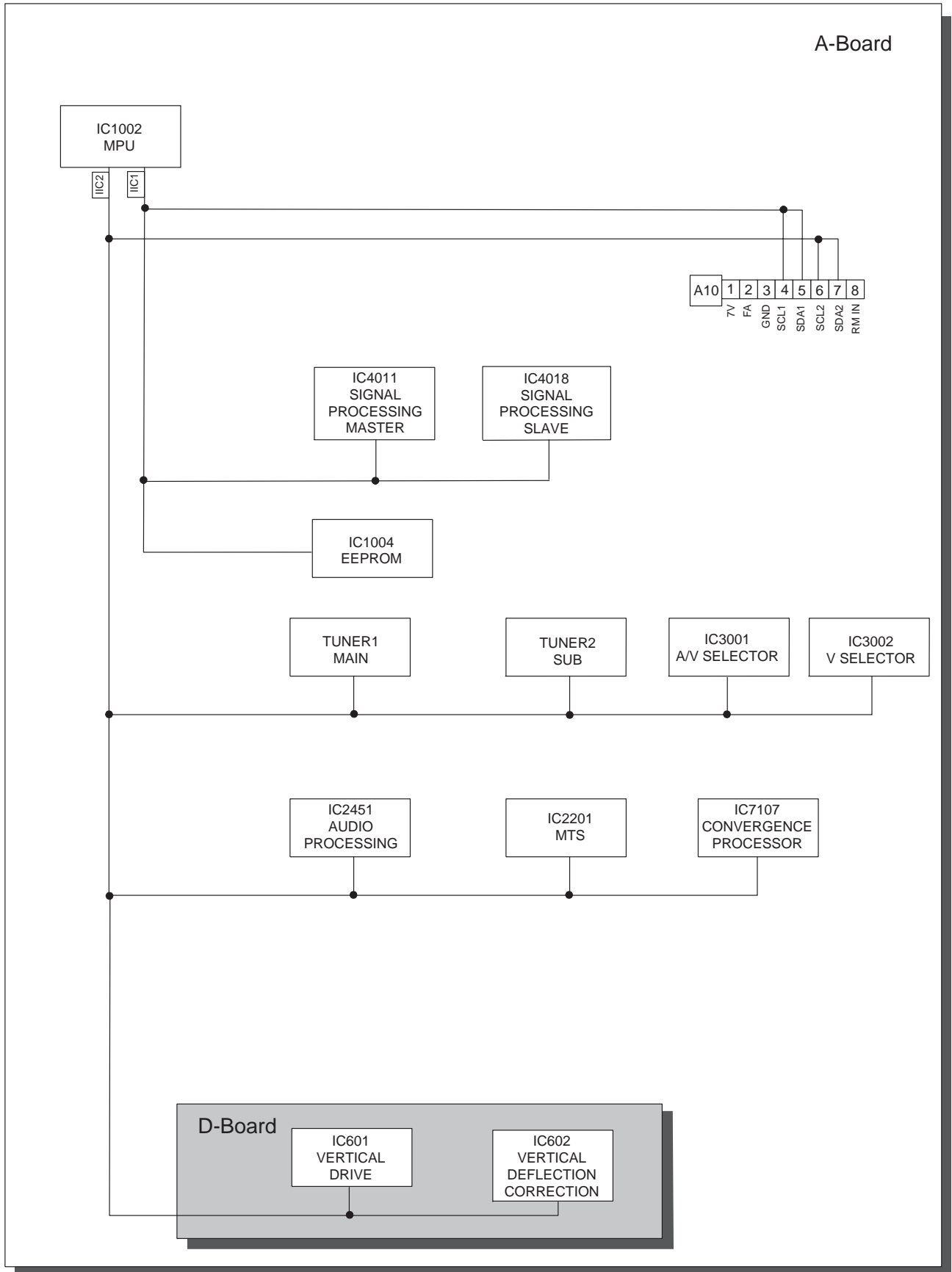


Figure 67. IIC connection

Description of connectors

D4--A4	
1	HHS DET
2	GND (CONV)
3	+18v
4	GND (CONV)
5	+18v
6	GND (CONV)
7	GND (CONV)
8	GND (REG)
9	-18v
10	GND (REG)
11	-18V
12	GND (REG)
13	GND (REG)
14	DAF
15	GND (REG)
16	DFCUT

D3--A3	
1	BLK
2	9V
3	SDA
4	GND
5	SCL
6	GND
7	GND
8	GND
9	VP3
10	GND
11	V-PULS
12	GND
13	GND
14	GND
15	H-PULS
16	SET +5v

D6--HVD	
1	STBY 7V
2	TO EHT SEPA. EHT REG GND
3	TO EHTSEPA. EHT CAPA GND
4	NC
5	TO EHT SEPA EHT F/B (R)
6	NC
7	STBY 7V

G1--A6	
1	Y/V
2	NC
3	GND
4	C
5	S
6	L
7	GND
8	R
9	GND

D2--A2	
1	GND
2	20V
3	GND
4	20V
5	GND
6	20V
7	GND
8	20V
9	GND
10	GND
11	GND
12	GND
13	ABL
14	GND
15	SOS
16	GND

D1--A1	
1	+20V
2	GND (SOUND)
3	+20V
4	GND (SOUND)
5	-20V
6	GND (SOUND)
7	-20V
8	C-BTL 40V
9	AC ON/OFF
10	P_BTL 40V
11	STAND BY GND
12	STBY 7V
13	NC
14	NC
15	TUNER GND
16	TUNER GND

R1--A51	
1	STB 3.3V
2	RM IN
3	GND

K3--A8	
1	GND
2	KEY SCAN 1
3	KEY SCAN 2
4	TP
5	GND
6	LED

LR1--LG3	
1	210V
2	NC
3	HEATER 6.3V
4	OFF MUTE
5	GND (SYGNAL)
6	R
7	12V
8	GND (PACHI)
9	S-ABL
10	18V
11	GND (VM)
12	VM
13	NC
14	140V

LB1--LG4	
1	210V
2	NC
3	HEATER 6.3 V
4	OFF MUTE
5	GND (SYGNAL)
6	B
7	12V
8	GND (PACHI)
9	S-ABL
10	18V
11	GND (VM)
12	VM
13	NC
14	140V
15	NC

LG1--A15	
1	GND
2	B
3	GND
4	R
5	GND
6	G
7	GND
8	GND
9	VM
10	GND (VM)
11	S-ABL
12	+12V

Description of connectors (continued)

LG2--D5	
1	210V
2	NC
3	GND
4	GND
5	+18V
6	+12V
7	HEATER
8	GND
9	NC
10	40V (+B OF VM)

A9--EEPROM	
1	NC
2	WP
3	GND
4	SCL
5	SDA
6	NC
7	NC

A10--BUSSCON	
1	STBY -7V
2	FA
3	GND
4	SCL1
5	SDA1
6	SCL2
7	SDA2
8	RM IN

REPLACEMENT PARTS LIST

Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
CAPACITORS		
C051	EEUFC1E470B	CAP,E 47UF-25V
C052	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C301	F2A2E100A026	CAP,E 10UF-250V
C302	ECCR1H221JC5	CAP,C 220PF-J-50V
C304	ECKW2H103PU8	CAP,C .01UF-P-500V
C305	F2A1H470A162	CAP,E 47UF-50V
C306	F2A2E100A026	CAP,E 10UF-250V
C307	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C310	F2A1H220A162	CAP,E 22UF-50V
C312	ECKC3D102KBN	CAP,C 1000PF-K-2KV
C313	ECKR2H102KB5	CAP,C 1000PF-K-500V
C331	F2A1H470A162	CAP,E 47UF-50V
C332	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C333	F2A1H470A162	CAP,E 47UF-50V
C334	F2A2E470A026	CAP,E 47UF-250V
C335	ECCR1H221JC5	CAP,C 220PF-J-50V
C336	F2A1H470A162	CAP,E 47UF-50V
C337	F2A2E470A026	CAP,E 47UF-250V
C339	ECKW2H103PU8	CAP,C .01UF-P-500V
C340	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C341	F2A2E100A026	CAP,E 10UF-250V
C342	F2A1H220A162	CAP,E 22UF-50V
C345	ECKC3D102KBN	CAP,C 1000PF-K-2KV
C346	ECKR2H102KB5	CAP,C 1000PF-K-500V
C361	F2A1C101A159	CAP,E 100UF-16V
C362	ECCR1H221JC5	CAP,C 220PF-J-50V
C364	ECKW2H103PU8	CAP,C .01UF-P-500V
C365	F2A2E100A026	CAP,E 10UF-250V
C366	F2A1H470A162	CAP,E 47UF-50V
C367	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C369	F2A1H470A162	CAP,E 47UF-50V
C372	ECKC3D102KBN	CAP,C 1000PF-K-2KV
C373	ECKR2H102KB5	CAP,C 1000PF-K-500V
C374	F2A1C101A159	CAP,E 100UF-16V
C405	F2A1E102A134	CAP,E 1000UF-25V
C406	F2A1E102A134	CAP,E 1000UF-25V
C407	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C408	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C411	TCJ2VB1H822K	CAP,C 8200PF-K-50V
C412	ECQB1224KF3	CAP,P .22UF-K-100V
C413	F2A1H1R0A162	CAP,E 1.0UF-50V
C414	TCJ2VB1H272K	CAP,C 2700PF-K-50V
C417	TCJ2VB1H103K	CAP,C .01UF-K-50V
C418	ECQB1H183JF3	CAP,P .018UF-J-50V
C421	ECEA1CN220UB	CAP,E 22UF-16V
C461	F2A1H221A162	CAP,E 220UF-50V
C501	F2A1V101A127	CAP,E 100UF-35V
C502	ECQV1H105JL3	CAP,P 1.0UF-J-50V
C503	ECKR2H102KB5	CAP,C 1000PF-K-500V

REF NO.	PART NO.	DESCRIPTION
C509	ECWF2474JSR	CAP,P .47UF-J-200V
C511	ECWH20222JVY	CAP,P 2200PF-J-2KV
C512	ECWH20102JVY	CAP,P 1000PF-J-2KV
C513	ECQF4103JZH	CAP,P .01UF-J-400V
C514	ECWH20222JVY	CAP,P 2200PF-J-2KV
C518	ECKW3D221JBP	CAP,C 220PF-J-2KVDC
C519	ECKW3D221JBP	CAP,C 220PF-J-2KVDC
C520	ECQB1H103JF3	CAP,P .01UF-J-50V
C522	ECWH20182JVY	CAP,P 1800PF-J-2KV
C523	ECWH20182JVY	CAP,P 1800PF-J-2KV
C524	ECQB1224JF3	CAP,P .22UF-J-100V
C525	ECEA1HN220UB	CAP,E 22UF/50V
C526	F2A2E101A026	CAP,E 100UF-250V
C527	ECKR2H102KB5	CAP,C 1000PF-K-500V
C528	F2A1H470A162	CAP,E 47UF-50V
C531	ECA160V33UE	CAP,E 33UF/160V
C532	ECQB1H103JF3	CAP,P .01UF-J-50V
C533	ECKR2H101KB5	CAP,C 100UF-K-500V
C535	F2A1H471A162	CAP,E 470UF-50V
C601	EEUFC1C331B	CAP,E 330UF-16V
C602	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C603	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C605	F2A1H1R0A162	CAP,E 1.0UF-50V
C606	F2A1H1R0A162	CAP,E 1.0UF-50V
C608	ECQB1H103JF3	CAP,P .01UF-J-50V
C609	TCJ2VC1H820J	CAP,C 82PF-J-50V
C610	ECQB1H473JF3	CAP,P .047UF-J-50V
C611	ECQV1H105JL3	CAP,P 1.0UF-J-50V
C613	F2A1C221A159	CAP,E 220UF-16V
C614	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C616	ECQB1H104JF3	CAP,P .10UF-J-50V
C617	F2A1C221A159	CAP,E 220UF-16V
C618	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C619	ECJ2VC1H272J	CAP,C 2700PF-J-50V
C620	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C621	ECQB1H681JF3	CAP,P 680PF-J-50V
C622	TCJ2VC1H221J	CAP,C 220PF-J-50V
C623	ECQB1H473JF3	CAP,P .047UF-J-50V
C624	TCJ2VB1H152K	CAP,C 1500PF-K-50V
C625	TCJ2VC1H820J	CAP,C 82PF-J-50V
C627	ECQB1H183JF3	CAP,P .018UF-J-50V
C629	ECQV1H474JL3	CAP,P .47UF-J-50V
C631	ECSF1EE225VB	CAP,E 2.2UF-25V
C632	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C701	F2A1C221A159	CAP,E 220UF-16V
C702	ECKR3D271KBP	CAP,C 270PF-K-2KV
C703	ECQM2104KZW	CAP,P .1UF-K-200V
C704	ECKR2H391KB5	CAP,C 390PF-K-500V
C705	ECKR2H561KB5	CAP,C 560PF-K-500V
C707	TCJ2VF1H103Z	CAP,C .01UF-Z-50V

REPLACEMENT PARTS LIST

Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C708	ECQE1685KFB	CAP,P 6.8UF-K-100V
C801	ECQU2A104MNB	CAP,P .10UF-M-250VAC
C802	ECQU2A823MNB	CAP,P .082UF-M-250VAC
C803	ECKCNA222ME7	CAP,C 2200PF-M-125V
C804	ECKCNA222ME7	CAP,C 2200PF-M-125V
C805	ECKR2H472PU7	CAP,C 4700PF-P-500V
C806	ECKR2H472PU7	CAP,C 4700PF-P-500V
C807	ECKR2H472PU7	CAP,C 4700PF-P-500V
C808	F2A1V101A127	CAP,E 100UF-35V
C809	TCJ2VB1E223K	CAP,C .022UF-K-25V
C810	EETED2D102C	CAP,E 1000PF-200V
C812	ECA1EHG471B	CAP,E 470UF-25V
C814	ECKW3D102KBP	CAP,C 1000PF-K-2KV
C815	ECQB1H152JF3	CAP,P 1500PF-J-50V
C816	ECKW3D821KBP	CAP,C 820PF-K-2KV
C817	ECKW3D102KBP	CAP,C 1000PF-K-2KV
C819	ECQB1H102JF3	CAP,P 1000PF-J-50V
C820	ECQV1H334JL3	CAP,P .33UF-J-50V
C821	ECQB1H272KF3	CAP,P 2700PF-K-50V
C822	F2A1H220A162	CAP,E 22UF-50V
C823	TCJ2VC1H151J	CAP,C 150PF-J-50V
C824	EEUFC1V151B	CAP,E 150UF-35V
C825	ECKCNA102MBB	CAP,C .001UF-M-125V
C826	TCJ2VB1E104K	CAP,C .1UF-K-25V
C830	EETHC2C471B	CAP,E 470PF-160V
C831	ECKR3D821KBP	CAP,C 820PF-K-2KV
C832	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C834	EEUFC1V222E	CAP,E 2200UF-35V
C836	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C837	F2A1E472A135	CAP,E 4700UF-25V
C838	F2A1E471A134	CAP,E 470UF-25V
C839	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C840	F2A1E471A134	CAP,E 470UF-25V
C841	F2A1E472A135	CAP,E 4700UF-25V
C842	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C843	F2A1V222A128	CAP,E 2200UF-35V
C844	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C845	F2A1V222A128	CAP,E 2200UF-35V
C846	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C848	F2A1C101A159	CAP,E 100UF-16V
C849	ECKR1H223ZF5	CAP,C .022UF-Z-50V
C851	ECQV1H104JL3	CAP,P .10UF-J-50V
C852	F2A1V101A127	CAP,E 100UF-35V
C854	F2A1C221A159	CAP,E 220UF-16V
C855	TCJ2VB1E104K	CAP,C .1UF-K-25V
C883	ECQV1H474JL3	CAP,P .47UF-J-50V
C890	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C897	ECQV1H474JL3	CAP,P .47UF-J-50V
C898	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C902	ECQM2103KZ3	CAP,P .01UF-K-200V

REF NO.	PART NO.	DESCRIPTION
C903	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C904	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C906	ECQM2103KZ3	CAP,P .01UF-K-200V
C907	F2A2C100A024	CAP,E 10UF-160V
C908	F2A1C101A159	CAP,E 100UF-16V
C909	F2A1C101A159	CAP,E 100UF-16V
C910	F2A2C100A024	CAP,E 10UF-160V
C912	F2A1H220A162	CAP,E 22UF-50V
C939	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C940	ECQM2103KZ3	CAP,P .01UF-K-200V
C941	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C942	ECQM2103KZ3	CAP,P .01UF-K-200V
C943	F2A2C100A024	CAP,E 10UF-160V
C944	F2A1C101A159	CAP,E 100UF-16V
C945	F2A1C101A159	CAP,E 100UF-16V
C947	F2A2C100A024	CAP,E 10UF-160V
C962	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C963	ECQM2103KZ3	CAP,P .01UF-K-200V
C965	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C966	ECQM2103KZ3	CAP,P .01UF-K-200V
C967	F2A2C100A024	CAP,E 10UF-160V
C968	F2A1C101A159	CAP,E 100UF-50V
C969	F2A1C101A159	CAP,E 100UF-16V
C970	F2A2C100A024	CAP,E 10UF-160V
C972	F2A1H470A162	CAP,E 47UF-50V
C1502	ECQE6104KFB	CAP,P 100UF-K-100V
C1503	ECQE6104KFB	CAP,P 100UF-K-100V
C1504	ECQB1H103JF3	CAP,P .01UF-J-50V
C1505	F2A1C221A159	CAP,E 220UF-16V
C1506	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C1508	ECQB1H223JF3	CAP,P .022UF-J-50V
C1510	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C1511	TCJ2VC1H471J	CAP,C 470PF-J-50V
C1512	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C1513	ECEA1EN101UB	CAP,E 100UF-25V
C1514	F2A1C101A159	CAP,E 100UF-16V
DIODES		
D081	LN21RCPHL	DIODE, LED
D082	MA4056MTA	DIODE
D083	MA4056MTA	DIODE
D301	MA167TA5	DIODE
D302	MA4150HTA	DIODE
D303	TVSRM1V1	DIODE
D304	MA165TA5VT	DIODE, SWITCHING
D306	MA165TA5VT	DIODE, SWITCHING
D307	MA165TA5VT	DIODE, SWITCHING
D312	MA188TA5	DIODE
D313	MA188TA5	DIODE
D314	MA188TA5	DIODE
D315	MA188TA5	DIODE

REPLACEMENT PARTS LIST

Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

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REF NO.	PART NO.	DESCRIPTION
D331	MA165TA5VT	DIODE, SWITCHING
D334	MA165TA5VT	DIODE, SWITCHING
D335	MA165TA5VT	DIODE, SWITCHING
D339	MA188TA5	DIODE
D340	MA188TA5	DIODE
D341	MA188TA5	DIODE
D342	MA188TA5	DIODE
D361	MA165TA5VT	DIODE, SWITCHING
D363	MA165TA5VT	DIODE, SWITCHING
D364	MA165TA5VT	DIODE, SWITCHING
D369	MA188TA5	DIODE
D370	MA188TA5	DIODE
D371	MA188TA5	DIODE
D372	MA188TA5	DIODE
D407	MA152KTX	DIODE
D409	MA165TA5VT	DIODE, SWITCHING
D410	MA152KTX	DIODE
D411	MA165TA5VT	DIODE, SWITCHING
D451	AM01ZV0	DIODE
D452	AM01ZV0	DIODE
D453	AM01ZV0	DIODE
D454	AM01ZV0	DIODE
D455	AM01ZV0	DIODE
D456	AM01ZV0	DIODE
D458	ERA15-01V3	DIODE, RECTIFIER
D501	D1NL40V70	DIODE
D502	MA4150MTA	DIODE
D503	FMV-3GULF730	DIODE
D504	MA4270MTA	DIODE
D509	MA165TA5VT	DIODE, SWITCHING
D510	MA4068LTA	DIODE
D511	ERA18-04V3	DIODE
D512	D1NL40V70	DIODE
D513	MA165TA5VT	DIODE, SWITCHING
D515	D1NL40V70	DIODE
D516	EU2YXV0	DIODE
D519	AU02ZV0	DIODE
D634	MA165TA5VT	DIODE, SWITCHING
D650	MA4110MTA	DIODE, ZENER
D651	MA4110MTA	DIODE, ZENER
D656	MA4110MTA	DIODE, ZENER
D657	MA4110MTA	DIODE, ZENER
D659	MA4110MTA	DIODE, ZENER
D660	MA4110MTA	DIODE, ZENER
D662	MA4110MTA	DIODE, ZENER
D663	MA4110MTA	DIODE, ZENER
D702	D1NL40V70	DIODE
D801	RBV-408	BRIDGE, RECTIFIER
D802	ERZC10VK361G	VARISTOR
D815	MA165TA5VT	DIODE, SWITCHING

REF NO.	PART NO.	DESCRIPTION
D816	MA700TA	DIODE
D817	AU01ZV0	DIODE
D818	MA3270LTX	DIODE
D819	TMPG10G3	DIODE
D822	ERA22-02V3	DIODE
D825	FMLG16SLF116	DIODE
D827	RL4ZLF-J6	DIODE
D828	B0HBRM000012	DIODE
D829	B0HBRM000012	DIODE
D830	RL4ZLF-J6	DIODE
D831	RL4ZLF-J6	DIODE
D835	TVSA81004V3	DIODE
D837	MA152KTX	DIODE
D895	MA165TA5VT	DIODE, SWITCHING
D902	MA188TA5	DIODE
D933	MA188TA5	DIODE
D953	TVSSR2KNV	DIODE, ZENER
D962	MA188TA5	DIODE
D973	TVSSR2KNV	DIODE, ZENER
D983	TVSSR2KNV	DIODE, ZENER
D1502	RP1H	DIODE
D1503	MA4030HTA	DIODE
D1504	RP1H	DIODE
D1505	MA29-BTA	DIODE
D1506	MA4051HTA	DIODE
D1599	MA152KTX	DIODE
FUSES		
F801	XBA1C63NU100	FUSE 6.3A/125V
INTEGRATED CIRCUITS		
IC451	LA78045	VERTICAL OUT
IC601	C0ZAZ0000091	HORIZONTAL OUT
IC602	TA8859AP	V SAW
IC603	BA15218F-E2	OP AMP
IC701	AN6914	OP AMP
IC801	AN8029	MAIN REG
IC802	SE139NLF4	ERROR AMP
IC803	AN78L12TA	9V REGULATOR
IC804	TVSS1WBS20	DIODE, BRIDGE RECTIFIER
IC805	AN78M09LB	9V REGULATOR
IC811	0N3171RLF	OPTO ISOLATOR
IC871	SI-8050J	5V REGULATOR
IC872	SI-8090J	9V REGULATOR
IC873	C0DAAZG00006	2.5V REGULATOR
IC880	AN78N12LB	12V REGULATOR
IC1501	AN6562S-E1	OP AMP
IC2302	TDA7490	AUDIO AMP L/R
IC7001	STK392-110	CONVERGENCE AMP
IC7002	STK392-110	CONVERGENCE AMP
COILS		
L301	ELEBD101KA	COIL, PEAKING 100UH

REPLACEMENT PARTS LIST

Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

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REF NO.	PART NO.	DESCRIPTION
L302	ELESN100JA	COIL, PEAKING 10UH
L303	ELESN6R8JA	COIL, PEAKING 6.8UH
L304	ELESN4R7JA	COIL, PEAKING 4.7UH
L331	ELESN100JA	COIL, PEAKING 10UH
L332	ELESN6R8JA	COIL, PEAKING 6.8UH
L333	TLTABT560K	COIL
L334	ELESN4R7KA	COIL, PEAKING 4.7UH
L335	ELEBD101KA	COIL, PEAKING 100UH
L337	TLTABT560K	COIL
L361	ELEBD101KA	COIL, PEAKING 100UH
L362	ELESN100JA	COIL, PEAKING 10UH
L363	ELESN150JA	COIL, PEAKING 15UH
L364	ELESN4R7JA	COIL, PEAKING 4.7UH
L500	TALL08TR82MA	COIL
L501	EXCELSA35T	FERRITE BEAD
L510	EXCELD25V	FERRITE BEAD
L511	EXCELD25V	FERRITE BEAD
L515	EXCELD25V	FERRITE BEAD
L516	EXCELD25V	FERRITE BEAD
L555	ELH5L718	COIL
L607	TALL08T680KA	LINE FILTER
L701	ELESN100KA	COIL, PEAKING 10UH
L702	EXCELSA35T	FERRITE BEAD
L703	TALFP15B332K	COIL
L704	ELC18B151G	FILTER
L705	TALFP15B332K	COIL
L801	ELF18D650M	CHOKES, AC LINE
L802	ELF21N035A	LINE FILTER
L805	EXCELD25V	FERRITE BEAD
L806	EXCELD25V	FERRITE BEAD
L808	EXCELD35V	FERRITE BEAD
L810	EXCELD25V	FERRITE BEAD
L811	EXCELD25V	FERRITE BEAD
L815	EXCELSA39E	FERRITE BEAD
L816	EXCELSA39E	FERRITE BEAD
L817	TALL08T680KA	LINE FILTER
L819	EXCELD35V	FERRITE BEAD
L820	EXCELD35V	FERRITE BEAD
L821	EXCELD35V	FERRITE BEAD
L825	TALL08T330KA	LINE FILTER
L826	TALL08T330KA	LINE FILTER
L827	TALL08T330KA	LINE FILTER
L888	TALL08T680KA	LINE FILTER
L901	EXCELSA35T	FERRITE BEAD
L902	EXCELSA35T	FERRITE BEAD
L903	EXCELSA35T	FERRITE BEAD
L933	EXCELSA35T	FERRITE BEAD
L934	EXCELSA35T	FERRITE BEAD
L935	EXCELSA35T	FERRITE BEAD
L961	EXCELSA35T	FERRITE BEAD

REF NO.	PART NO.	DESCRIPTION
L962	EXCELSA35T	FERRITE BEAD
L963	EXCELSA35T	FERRITE BEAD
TRANSISTORS		
Q301	2SC1473A	TRANSISTOR
Q302	2SC3526H	TRANSISTOR
Q303	2SC1473A	TRANSISTOR
Q331	2SC3526H	TRANSISTOR
Q353	2SC3942LB	TRANSISTOR
Q354	2SC3790E-RA	TRANSISTOR
Q355	2SA1480E-RA	TRANSISTOR
Q361	2SC3311ATA	TRANSISTOR
Q362	2SC3311ATA	TRANSISTOR
Q363	2SC3526H	TRANSISTOR
Q364	2SA1309ATA	TRANSISTOR
Q365	2SC3311ATA	TRANSISTOR
Q366	2SC3311ATA	TRANSISTOR
Q368	2SA1309ATA	TRANSISTOR
Q373	2SC3942LB	TRANSISTOR
Q374	2SC3790E-RA	TRANSISTOR
Q375	2SA1480E-RA	TRANSISTOR
Q393	2SC3942LB	TRANSISTOR
Q394	2SC3790E-RA	TRANSISTOR
Q395	2SA1480E-RA	TRANSISTOR
Q406	2SD601ARTX	TRANSISTOR
Q501	2SK2962TPE6	TRANSISTOR
Q502	2SK2847LBMAT	TRANSISTOR
Q503	2SD601ARTX	TRANSISTOR
Q509	2SC1473QR	TRANSISTOR
Q510	2SC1473QR	TRANSISTOR
Q551	2SC5612LB228	TRANSISTOR
Q601	2SD601ARTX	TRANSISTOR
Q602	2SD601ARTX	TRANSISTOR
Q603	2SD601ARTX	TRANSISTOR
Q604	2SD601ARTX	TRANSISTOR
Q605	2SB709ARTX	TRANSISTOR
Q606	2SD601ARTX	TRANSISTOR
Q701	2SK2538000LB	TRANSISTOR
Q801	2SK2917LB	TRANSISTOR
Q802	2SD601ARTX	TRANSISTOR
Q803	2SB709ARTX	TRANSISTOR
Q854	2SA19610QAHW	TRANSISTOR
Q901	2SA720ARTX	TRANSISTOR
Q903	2SA720TA	TRANSISTOR
Q904	2SC1318ARTX	TRANSISTOR
Q905	2SC1318ATA	TRANSISTOR
Q906	2SC1318ATA	TRANSISTOR
Q907	2SA720TA	TRANSISTOR
Q934	2SA720TA	TRANSISTOR
Q935	2SC1318ATA	TRANSISTOR
Q936	2SC1318ATA	TRANSISTOR

REPLACEMENT PARTS LIST

Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

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REF NO.	PART NO.	DESCRIPTION
Q937	2SA720TA	TRANSISTOR
Q938	2SA720ARTA	TRANSISTOR
Q941	2SC1318ARTA	TRANSISTOR
Q951	2SC3311ATA	TRANSISTOR
Q952	2SC3311ATA	TRANSISTOR
Q953	2SC3311ATA	TRANSISTOR
Q955	2SA1535ALB	TRANSISTOR
Q956	2SC3944ALB	TRANSISTOR
Q957	2SA1535ALB	TRANSISTOR
Q958	2SC3944ALB	TRANSISTOR
Q959	2SA1535ALB	TRANSISTOR
Q960	2SC3944ALB	TRANSISTOR
Q961	2SA720ARTA	TRANSISTOR
Q964	2SC1318ARTA	TRANSISTOR
Q965	2SA720TA	TRANSISTOR
Q966	2SC1318ATA	TRANSISTOR
Q967	2SC1318ATA	TRANSISTOR
Q968	2SA720TA	TRANSISTOR
Q1503	2SA1309ATA	TRANSISTOR
Q1504	2SC4635-YB7	TRANSISTOR
Q1505	2SC3311ATA	TRANSISTOR
RELAYS		
RL801	K6B1ADA00010	RELAY
RL802	K6B1ADA00010	RELAY
RESISTORS		
JS063	ERDS2TJ124T	RES,C 120K-J-1/4W
RM002	PNA4701M05TV	INT CKT
R013	ERG1SJ273P	RES,M 27K-J-1W
R015	ERG1SJ273P	RES,M 27K-J-1W
R072	ERDS2TJ101T	RES,C 100-J-1/4W
R073	ERDS2TJ471T	RES,C 470-J-1/4W
R080	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R081	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R082	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R083	ERDS2TJ512T	RES,C 5.1K-J-1/4W
R084	ERDS2TJ912T	RES,C 9.1K-J-1/4W
R086	ERDS2TJ102T	RES,C 1K-J-1/4W
R087	ERDS2TJ331T	RES,C 330-J-1/4W
R301	ERDS1FJ394P	RES,C 390K-J-1/2W
R302	ERDS2TJ151T	RES,C 150-J-1/4W
R303	ER0S2THF2200	RES,M 220-F-1/4W
R304	ERDS2TJ334T	RES,C 330K-J-1/4W
R305	ER0S2THF2200	RES,M 220-F-1/4W
R306	ER0S2THF4700	RES,M 470-F-1/4W
R307	ERDS2TJ220T	RES,C 22-J-1/4W
R308	ERDS2TJ334T	RES,C 330K-J-1/4W
R310	ERDS2TJ183T	RES,C 18K-J-1/4W
R311	ERDS2TJ470T	RES,C 47-J-1/4W
R312	ERG7ZJ272	RES,M 2.7K-J-7W
R315	ERDS2TJ563T	RES,C 56K-J-1/4W

REF NO.	PART NO.	DESCRIPTION
R316	ERDS2TJ821T	RES,C 820-J-1/4W
R319	ERG12SJ101P	RES,M 100-J-1W
R320	ERDS1FJ330P	RES,C 33-J-1/2W
R321	ERDS1FJ330P	RES,C 33-J-1/2W
R322	ERG12SJ101P	RES,M 100-J-1W
R325	ERDS2TJ473T	RES,C 47K-J-1/4W
R327	ERC12GK331D	RES,C 330-K-1/2W
R328	ERDS1TJ104T	RES,C 100K-J-1/2W
R331	ER0S2THF2200	RES,M 220-F-1/4W
R332	ERDS2TJ151T	RES,C 150-J-1/4W
R333	ER0S2THF2200	RES,M 220-F-1/4W
R334	ERDS2TJ220T	RES,C 22-J-1/4W
R335	ER0S2THF4700	RES,M 470-F-1/4W
R345	ERDS2TJ470T	RES,C 47-J-1/4W
R347	ERG7ZJ272	RES,M 2.7K-J-7W
R348	ERDS2TJ563T	RES,C 56K-J-1/4W
R349	ERDS2TJ821T	RES,C 820-J-1/4W
R350	ERG12SJ101P	RES,M 100-J-1W
R351	ERDS1FJ330P	RES,C 33-J-1/2W
R352	ERDS1FJ330P	RES,C 33-J-1/2W
R353	ERG12SJ101P	RES,M 100-J-1W
R354	ERDS2TJ473T	RES,C 47K-J-1/4W
R356	ERC12GK331D	RES,C 330-K-1/2W
R357	ERDS1TJ104T	RES,C 100K-J-1/2W
R361	ER0S2THF1302	RES,M 13K-F-1/4W
R362	ER0S2THF1002	RES,M 10K-F-1/4W
R363	ERDS2TJ220T	RES,C 22-J-1/4W
R364	ERDS2TJ102T	RES,C 1K-J-1/4W
R365	ERDS2TJ221T	RES,C 220-J-1/4W
R366	ERDS2TJ151T	RES,C 150-J-1/4W
R367	ER0S2THF2200	RES,M 220-F-1/4W
R368	ER0S2THF2200	RES,M 220-F-1/4W
R369	ERDS2TJ472T	RES,C 4.7K-J-1/4
R372	ER0S2THF82R0	RES,M 82.0-F-1/4W
R375	ERDS2TJ470T	RES,C 47-J-1/4W
R376	ERG7ZJ272	RES,M 2.7K-J-7W
R379	ERDS2TJ563T	RES,C 56K-J-1/4W
R380	ERDS2TJ821T	RES,C 820-J-1/4W
R383	ERG12SJ101P	RES,M 100-J-1W
R384	ERDS1FJ330P	RES,C 33-J-1/2W
R385	ERDS1FJ330P	RES,C 33-J-1/2W
R386	ERG12SJ101P	RES,M 100-J-1W
R389	ERDS2TJ473T	RES,C 47K-J-1/4W
R390	ERC12GK331D	RES,C 330-K-1/2W
R391	ERDS1TJ104T	RES,C 100K-J-1/2W
R392	ER0S2THF8201	RES,M 8.2K-F-1/4W
R393	ER0S2THF8201	RES,M 8.2K-F-1/4W
R394	ERDS2TJ102T	RES,C 1K-J-1/4W
R395	ERDS2TJ221T	RES,C 220-J-1/4W
R396	ERDS2TJ472T	RES,C 4.7K-J-1/4

REPLACEMENT PARTS LIST

Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R397	ER0S2THF1201	RES,M 1.2K-F-1/4W
R398	ER0S2THF3300	RES,M 330-F-1/4W
R408	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R409	ERDS2TJ563T	RES,C 56K-J-1/4W
R410	ERJ6GEYJ224V	RES,M 220K-J-1/10W
R411	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R412	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R415	ERG3FJ331H	RES,M 330-J-3W
R421	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R422	ERJ6GEYJ101V	RES,M 100-J-1/10W
R423	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R425	ERDS1FJ1R0P	RES,C 1.0-J-1/2W
R426	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R428	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R434	ERX12SJ1R8P	RES,M 1.8-J-1/2W
R435	ERX12SJ1R8P	RES,M 1.8-J-1/2W
R465	ERDS2TJ392T	RES,C 3.9K-J-1/4W
R466	ERDS2TJ562T	RES,C 5.6K-J-1/4W
R470	ERDS2TJ331T	RES,C 330-J-1/4W
R471	ERDS2TJ331T	RES,C 330-J-1/4W
R472	ERDS2TJ331T	RES,C 330-J-1/4W
R501	ERDS2TJ104T	RES,C 100K-J-1/4W
R502	ERDS2TJ680T	RES,C 68-J-1/4W
R503	ERG2FJ180H	RES,M 18-J-2W
R504	ERG3FJ271H	RES,M 270-J-3W
R505	ERG1SJ120P	RES,M 12-J-1W
R506	ERX1SJ47P	RES,M .47-J-1W
R513	ERDS2TJ471T	RES,C 470-J-1/4W
R514	ER0S2THF3322	RES,M 33.2K-F-1/4W
R515	ER0S2THF4702	RES,M 47K-F-1/4W
R516	ERJ6GEYJ101V	RES,M 100-J-1/10W
R517	ERDS2TJ103T	RES,C 10K-J-1/4W
R518	ERX12SJR22V	RES,M .22-J-1/2
R519	ERQ12HKR22P	RES,F .22-K-1/2W
R520	ERQ12HJ330P	RES,F 33-J-1/2W
R521	ER0S2THF2612	RES,M 26.1K-F-1/4W
R522	ER0S2THF7151	RES,M 7.15K-F-1/4W
R523	ERDS2TJ275T	RES,C 2.7MEG-J-1/4W
R524	EVM38GA00B54	CONTROL 5K
R525	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R534	ERDS2TJ224T	RES,C 220K-J-1/4W
R535	ERDS2TJ272T	RES,C 2.7K-J-1/4W
R536	ERDS2TJ101T	RES,C 100-J-1/4W
R537	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R538	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R539	ERDS2TJ393T	RES,C 39K-J-1/4W
R541	ERDS2TJ563T	RES,C 56K-J-1/4W
R550	ERDS2TJ273T	RES,C 27K-J-1/4W
R601	ERJ6GEYJ101V	RES,M 100-J-1/10W
R602	ERJ6GEYJ101V	RES,M 100-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R603	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R604	ERJ6GEYJ101V	RES,M 100-J-1/10W
R605	ERJ6GEYJ101V	RES,M 100-J-1/10W
R606	ERJ6GEYJ101V	RES,M 100-J-1/10W
R607	ER0S2THF6201	RES,M 6.2K-F-1/4W
R608	ERJ6ENF3830V	RES,M 383-F-1/10W
R609	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R610	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R611	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R612	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R613	ERDS2TJ561T	RES,C 560-J-1/4W
R614	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R615	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R616	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R617	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R618	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R619	ERDS2TJ331T	RES,C 330-J-1/4W
R620	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R621	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R622	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R623	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R624	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R625	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R626	ERG1SJ122P	RES,M 1.2K-J-1W
R627	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R628	ERDS2TJ391T	RES,C 390-J-1/4W
R629	ERJ6GEYJ100V	RES,M 10-J-1/10W
R630	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R631	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R632	ERJ6GEYJ331V	RES,M 330-J-1/10W
R633	ERJ6GEYJ182V	RES,M 1.8K-J-1/10W
R634	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R635	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R636	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R637	ERDS2TJ101T	RES,C 100-J-1/4W
R638	ERDS2TJ101T	RES,C 100-J-1/4W
R642	ERDS2TJ101T	RES,C 100-J-1/4W
R643	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R644	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R645	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R653	ERDS2TJ101T	RES,C 100-J-1/4W
R654	ERDS2TJ184T	RES,C 180K-J-1/4W
R655	ERDS2TJ184T	RES,C 180K-J-1/4W
R704	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R706	ERDS1FJ680T	RES,C 68-J-1/2W
R707	ERG2FJ222H	RES,M 2.2K-J-2W
R708	ERF5AK4R7H	RES,W 4.7-K-5W
R709	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R800	ERU5TCK1R5T	RES,F 1.5-K-5W
R805	ERDS2TJ101T	RES,C 100-J-1/4W

REPLACEMENT PARTS LIST

Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R808	ERX12SZJR12P	RES,M .12-J-1/2W
R809	ERJ6GEYJ225V	RES,M 2.2M-J-1/10W
R810	ERX12SZJR12P	RES,M .12-J-1/2W
R811	ERX12SZJR12P	RES,M .12-J-1/2W
R812	ERDS2TJ103T	RES,C 10K-J-1/4W
R813	ERDS1FJ561T	RES,C 560-J-1/2
R814	ERDS2TJ4R7T	RES,C 4.7-J-1/4W
R815	ERJ6GEYJ471V	RES,M 470-J-1/10W
R816	ERDS2TJ471T	RES,C 470-J-1/4W
R817	ERJ6ENF2001V	RES,M 2K-F-1/10W
R818	ERDS1FJ100T	RES,C 10-J-1/2W
R820	ERDS1FJ470T	RES,C 47-J-1/2W
R822	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R832	ERD75TAJ825	RES,C 8.2MEG-J-3/4W
R833	ERJ6GEYJ101V	RES,M 100-J-1/10W
R835	ERDS2TJ101T	RES,C 100-J-1/4W
R836	ERJ6GEYJ101V	RES,M 100-J-1/10W
R839	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R840	ERJ6GEYJ101V	RES,M 100-J-1/10W
R846	ERDS2TJ223T	RES,C 22K-J-1/4W
R847	ERDS2TJ272T	RES,C 2.7K-J-1/4W
R857	ERX1SJ1R0P	RES,M 1.0-J-1W
R858	ERX1SJ1R0P	RES,M 1.0-J-1W
R859	ERDS2TJ103T	RES,C 10K-J-1/4W
R860	ERDS1FJ222T	RES,C 2200-J-1/2W
R862	ERG3FJ333H	RES,M 33K-J-3W
R865	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R866	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R867	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R880	TSF39402	FUSE 4.0A/125V
R881	TSF39402	FUSE 4.0A/125V
R895	ERDS2TJ100T	RES,C 10-J-1/4W
R896	ERDS1FJ820T	RES,C 82-J-1/2W
R901	ERDS2FJ122T	RES,C 1.2K-J-1/2W
R902	ERDS2TJ103T	RES,C 10K-J-1/4W
R903	ERDS2TJ683T	RES,C 68K-J-1/4W
R904	ERDS2TJ683T	RES,C 68K-J-1/4W
R905	ERDS2TJ103T	RES,C 10K-J-1/4W
R906	ERDS2TJ122T	RES,C 1.2K-J-1/4W
R907	ERDS1FVJ390T	RES,C 39-J-1/2W
R908	ERDS1FVJ390T	RES,C 39-J-1/2W
R909	ERDS1FVJ8R2T	RES,C 8.2-J-1/2W
R910	ERDS2TJ8R2T	RES,C 8.2-J-1/4W
R911	ERG3SJS221H	RES,M 220-J-3W
R912	ERDS2TJ681T	RES,C 680-J-1/4W
R913	ERDS1FVJ152T	RES,C 1.5K-J-1/2W
R914	ERDS1FVJ152T	RES,C 1.5K-J-1/2W
R915	ERQ14AJ220P	RES,F 22-J-1/4W
R916	ERQ14AJ220P	RES,F 22-J-1/4W
R917	ERQ14AJ100P	RES,F 10-J-1/4W

REF NO.	PART NO.	DESCRIPTION
R925	ERDS2TJ221T	RES,C 220-J-1/4W
R926	ERDS2TJ221T	RES,C 220-J-1/4W
R928	ERQ14AJ220P	RES,F 22-J-1/4W
R929	ERDS2TJ101T	RES,C 100-J-1/4W
R942	ERDS1FVJ152T	RES,C 1.5K-J-1/2W
R943	ERDS1FVJ152T	RES,C 1.5K-J-1/2W
R944	ERDS2TJ471T	RES,C 470-J-1/4W
R945	ERDS2TJ471T	RES,C 470-J-1/4W
R946	ERQ14AJ100P	RES,F 10-J-1/4W
R947	ERQ14AJ220P	RES,F 22-J-1/4W
R948	ERDS2FJ122T	RES,C 1.2K-J-1/2W
R949	ERDS2TJ103T	RES,C 10K-J-1/4W
R950	ERDS2TJ683T	RES,C 68K-J-1/4W
R951	ERDS2TJ683T	RES,C 68K-J-1/4W
R952	ERDS2TJ103T	RES,C 10K-J-1/4W
R953	ERDS2TJ122T	RES,C 1.2K-J-1/4W
R954	ERDS1FVJ390T	RES,C 39-J-1/2W
R955	ERDS1FVJ390T	RES,C 39-J-1/2W
R956	ERDS1FVJ8R2T	RES,C 8.2-J-1/2W
R957	ERDS2TJ8R2T	RES,C 8.2-J-1/4W
R958	ERG3SJS221H	RES,M 220-J-3W
R959	ERDS2TJ471T	RES,C 470-J-1/4W
R961	ERDS2FJ122T	RES,C 1.2K-J-1/2W
R962	ERDS2TJ103T	RES,C 10K-J-1/4W
R963	ERDS2TJ683T	RES,C 68K-J-1/4W
R964	ERDS2TJ683T	RES,C 68K-J-1/4W
R965	ERDS2TJ103T	RES,C 10K-J-1/4W
R966	ERDS2TJ122T	RES,C 1.2K-J-1/4W
R967	ERDS1FVJ390T	RES,C 39-J-1/2W
R968	ERDS1FVJ390T	RES,C 39-J-1/2W
R969	ERDS1FVJ8R2T	RES,C 8.2-J-1/2W
R970	ERDS2TJ8R2T	RES,C 8.2-J-1/4W
R971	ERG3SJS221H	RES,M 220-J-3W
R972	ERDS2TJ101T	RES,C 100-J-1/4W
R973	ERDS1FVJ152T	RES,C 1.5K-J-1/2W
R974	ERDS1FVJ152T	RES,C 1.5K-J-1/2W
R975	ERQ14AJ100P	RES,F 10-J-1/4W
R976	ERQ14AJ220P	RES,F 22-J-1/4W
R978	ERQ14AJ220P	RES,F 22-J-1/4W
R1501	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R1503	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R1504	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R1505	ERDS2TJ102T	RES,C 1K-J-1/4W
R1506	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R1507	ERG3SJD222L	RES,M 2200-J-3W
R1508	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R1510	ERG2SJD273L	RES,M 27K-J-2W
R1511	ERG2SJD273L	RES,M 27K-J-2W
R1512	ERJ6ENF1501V	RES,M 1.5K-F-1/10W
R1514	ERG2SJD273L	RES,M 27K-J-2W

REPLACEMENT PARTS LIST

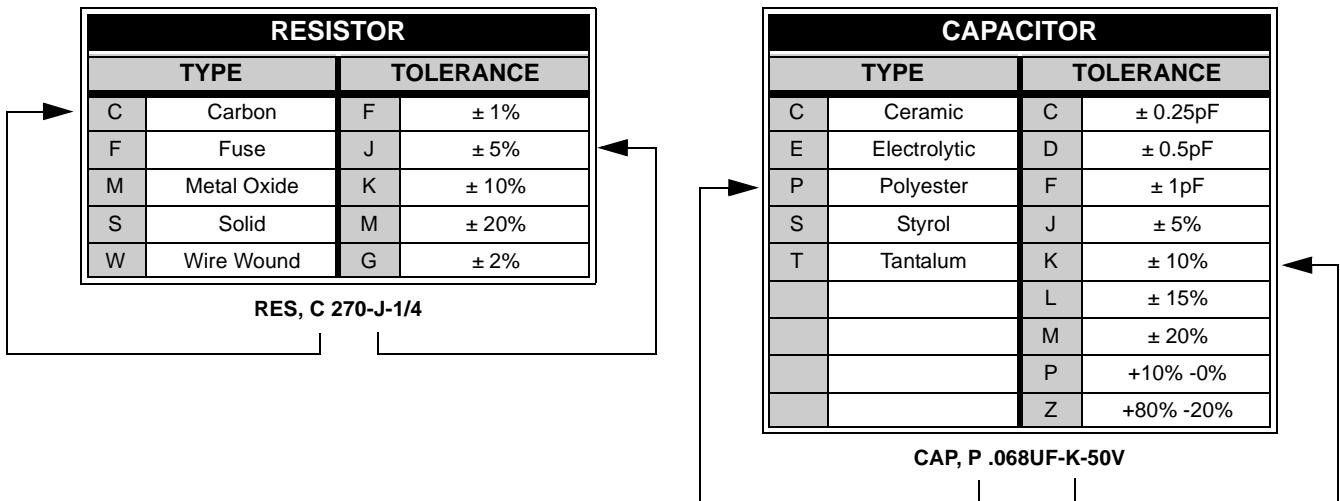
Models: PT-47WX42F, PT-47WX42CF, PT-47WX52F, PT-47WX52CF

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R1515	ERJ6ENF1001V	RES,M 1K-F-1/10W
R1516	ERJ6GEYJ101V	RES,M 100-J-1/10W
R1517	ERJ6ENF3571V	RES,M 3.57K-F-1/10W
R1518	ERG2SJD273L	RES,M 27K-J-2W
R1519	ERDS2TJ101T	RES,C 100-J-1/4W
R1520	ERDS2TJ221T	RES,C 220-J-1/4W
R1521	ER0S2THF5100	RES,M 510-F-1/4W
R1522	ERC12GK103D	RES,C 10K-K-1/2W
R1523	ERDS2TJ104T	RES,C 100K-J-1/4W
R1524	ER0S2THF9100	RES,M 910-F-1/4W
R1526	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R1527	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R1528	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R1529	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R1542	ERG2SJD273L	RES,M 27K-J-2W
R1544	ERJ6GEYJ471V	RES,M 470-J-1/10W
R1546	ERJ6GEYJ221V	RES,M 220-J-1/10W
R1599	ERJ6ENF9761V	RES,M 9760-F-1/10W
SWITCHES		
S010	SKHHDTA010	SWITCH
S011	SKHHDTA010	SWITCH
S012	SKHHDTA010	SWITCH
S013	SKHHDTA010	SWITCH
S014	SKHHDTA010	SWITCH
S015	SKHHDTA010	SWITCH
S016	SKHHDTA010	SWITCH
TRANSFORMERS		
T501	ETH19K186AM	TRANSFORMER
T551	KFT7AA334F	TRANSFORMER, FLYBACK
T801	ETS39AG2U5BC	TRANSFORMER, SWITCHING
T802	ETP30KB941JG	TRANSFORMER
CRYSTALS/FILTERS		
X601	TAFCSB503F30	CRYSTAL
OTHERS		
TNR001	ENG36602GS	TUNER
TNR002	ENG36603GR	TUNER
M001	TSX2AA0291	A/C LINE CORD W/FILTER
M002	TXFCRT14FSER	ASSY, CRT (B)
M003	TXFCRT15FSER	ASSY, CRT (G)
M004	TXFCRT16FSER	ASSY, CRT (R)
M005	TJSC00700	CRT SOCKET
DY	KDY2ASC29F	YOKE, DEFLECTION
M006	TXF3A01ECV	ASSY, DAG GND
M007	TKG2AF020	A/B LENS
M008	TKG2AA50091	MIRROR, GLASS
M009	TKG2AD00071	SCREEN PANEL, PROTECTIVE PT-47WX52F/CF
M010	TKG2AH50471	SCREEN, FRESNEL
M011	TKG2AH50461	SCREEN, LENTICULAR
M012	TXFLB01FSER	ASSY, ADJUSTED LIGHT BOX
M013	TMK2AX00305	SHEET, LIGHT COVER

REF NO.	PART NO.	DESCRIPTION
M014	TNXB003	FOCUS BLOCK
M015	TKU2AC2201S	CABINET BACK
M016	TKY2AA3003S	CABINET FRONT PT-47WX52F/CF
M017	TKY2AA3005S	CABINET FRONT PT-47WX42F/CF
M018	TAS2AA0026	SPEAKER 15 WATTPT-47WX42F/CF
M019	TAS2AA0027	SPEAKER WOOFER PT-47WX52F/CF
M020	TAS2AA0022	SPEAKER TWEETER PT-47WX52F/CF
M021	ENPE2A001	SPLITTER 2RF (U-LIM)
M022	KFT7CP336F	TRANSFORMER DISTRIBUTOR
M023	TBL2AH30071	CASTER
M024	TBM2AA0012	BADGE, PANASONIC
M025	TBX2AA0161G	BUTTON, 7-KEY
M026	TKD2AX0621	INNER BARRIER BOARD
M027	TKP2AA0584S	BRACKET, REAR
M028	TKU2AA02701A	CABINET BACK, LOWER
M029	TKB2AA0172S	ASSY, CABINET WOOD PT-47WX42F/CF
M030	TKB2AA0173S	ASSY, CABINET WOOD PTV PT-47WX52F/CF
M031	TKP2AA0649S	ASSY, CONTROL PANEL PT-47WX52F/CF
M032	TKP2AA06491S	ASSY, CONTROL PANEL PT-47WX42F/CF
M033	TKP2AA0622S	ASSY, SPEAKER GRILLE PT-47WX42F/CF
M034	TKP2AA0626S	ASSY, SPEAKER GRILLE PT-47WX52F/CF
M035	TKP2AA0681	LED PANEL
JK1001	TJB2A10013	TERMINAL, A/V (FRONT)
JK3001	TJB2AA0311	TERMINAL, A/V (REAR)
ACCESORIES		
M036	EUR7613Z40	REMOTE CONTROL PT-47WX42F/CF
M037	EUR7603Z30	REMOTE CONTROL PT-47WX52F/CF
M038	UR76EC0303A	BATTERY COVER, REMOTE CONTROL
M039	TXANV05ESER	BRKT. MIRROR, SIDE
M040	TXANV06ESER	BRKT. MIRROR, TOP
M041	TXANV10ESER	SCREEN BRACKET
M042	TQB2AA0420	MANUAL, OWNERS PT-47WX42F, PT-47WX52F
M043	TQB2AA0421	MANUAL, OWNERS PT-47WX52CF, PT-47WX42CF

DESCRIPTION OF ABBREVIATIONS GUIDE

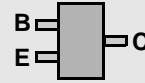


Notes:

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A Δ IN THE SCHEMATIC.

CHIP TRANSISTOR LEAD DESIGNATION



SCHEMATIC NOTES

1. Resistors are carbon 1/4W unless noted otherwise.
 2. Capacitors are ceramic 50V unless noted otherwise.
 3. Coil value notes is inductance in μ H.
 4. Test point indicated by \uparrow ; Test point but no pin \uparrow .
 5. Components indicated with Δ are critical parts and replacement should be made with manufacture specified replacement parts only.
 6. **——** (BOLD LINE) indicates the route of B+ supply.
 7. The schematic diagrams are current at the time of printing and are subject to change without notice.
 8. Ground symbol \downarrow indicates **HOT GROUND CONNECTION**; \uparrow indicates COLD GROUND.
- NOTE: All other component symbols are used for engineering design purposes.*

VOLTAGE MEASUREMENTS

1. Voltage measurement:
 - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
 - All Picture and Audio adjustments are set to Normalize.
TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
Volume - Min.
TV/Video SW - TV position
Audio Mode - Stereo
 - Voltage readings are nominal and may vary $\pm 10\%$ on active devices. Some voltage reading will vary with signal strength and picture content.
 - Supply voltages are nominal.
 2. Ground symbol \downarrow indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.
- CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.**

WAVEFORM MEASUREMENTS

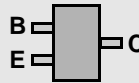
1. $\textcircled{3}$ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
 2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
 3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
 4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
 5. Ground symbol \downarrow shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.
- CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.**

Notes

NOTA DE SEGURIDAD

LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRÍTICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRÍTICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO \triangle .

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN CHIP



NOTAS DE LOS DIAGRAMAS

1. Las Resistencias son de Carbón de 1/4W, a menos que se indique otra característica.
 2. Los Capacitores son de Cerámica para 50V, a menos que se indique otra característica.
 3. El valor indicado de las Bobinas es la inductancia expresada en μ H.
 4. Los puntos de prueba en la terminal de algún componente son indicados por \uparrow . Los puntos de prueba fuera de los componentes se indican con \uparrow .
 5. Los componentes señalados con el símbolo \triangle son considerados componentes críticos y deben ser reemplazados sólo con las partes especificadas por el fabricante.
 6. **— (LINEA GRUESA)** indica las líneas de alimentación de los Voltajes B+.
 7. Los diagramas eléctricos están sujetos a cambio sin previo aviso.
 8. El símbolo \downarrow indica que es una conexión a **Tierra Caliente** y el símbolo \uparrow indica conexión a **Tierra Fría**.
- NOTA: Los demás símbolos de componentes incluidos son usados con fines de diseño.**

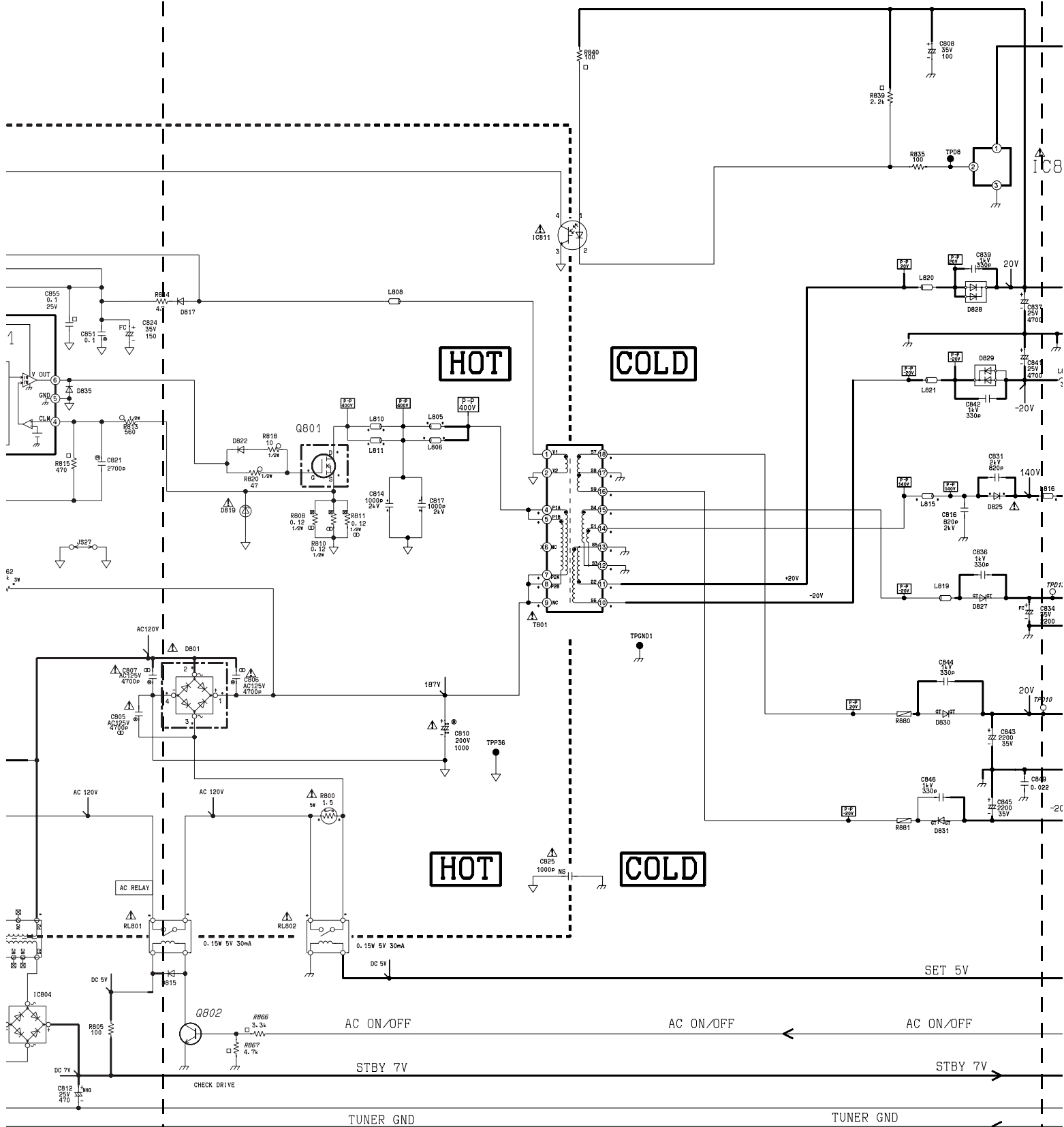
MEDICIÓN DE VOLTAJES

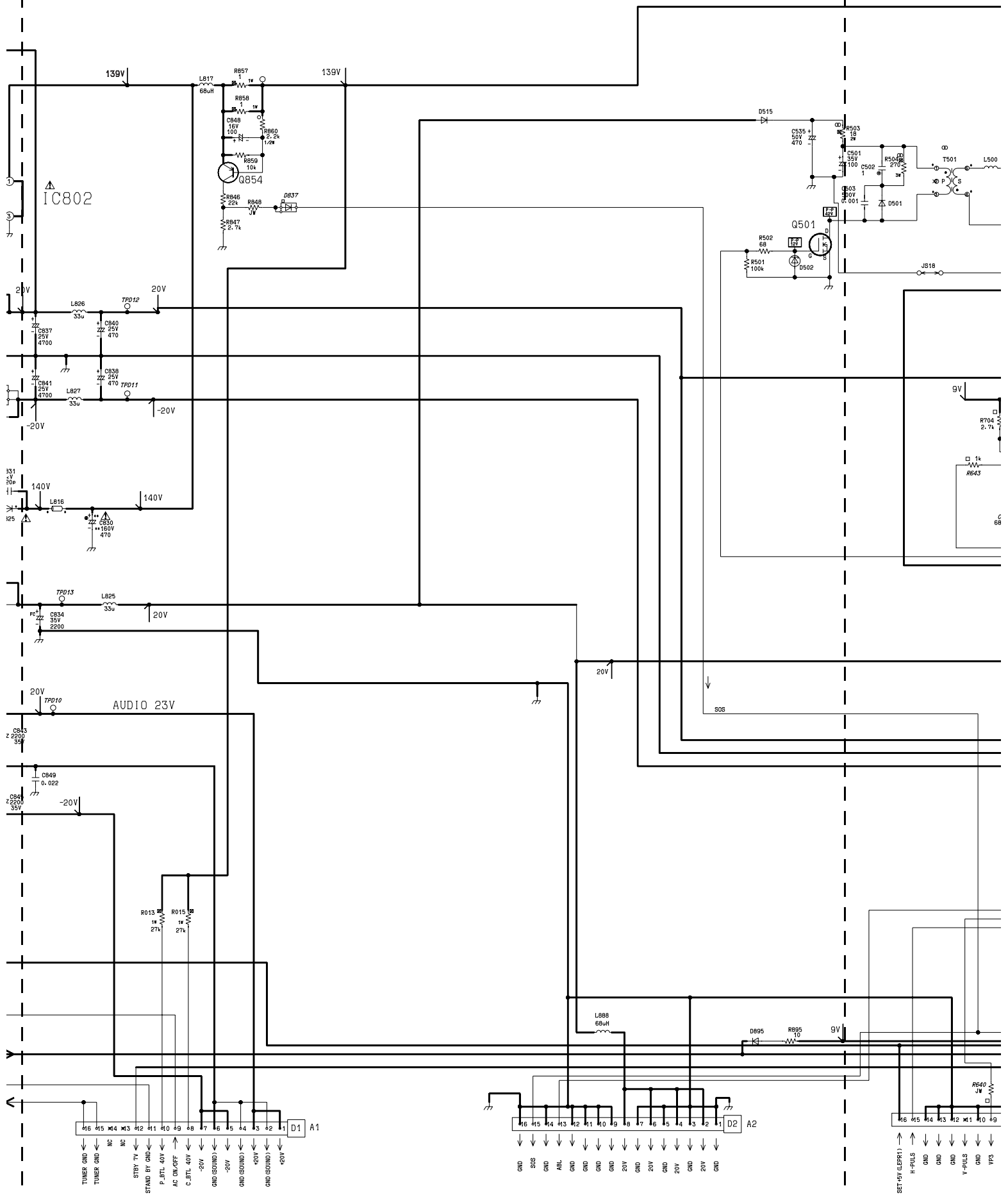
1. Medición de voltaje:
 - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
 - Los ajustes de los Menus Picture y Audio se normalizan. En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE. El nivel de Volumen se minimiza. De los modos TV y Video, seleccionar el modo TV. Seleccionar modo Estereo del Audio.
 - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
 - Las fuentes de voltajes son nominales.
 2. El símbolo \downarrow indica el tipo de tierra que se utiliza en la conexión del medidor.
- PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.**

MEDICIÓN DE FORMAS DE ONDA

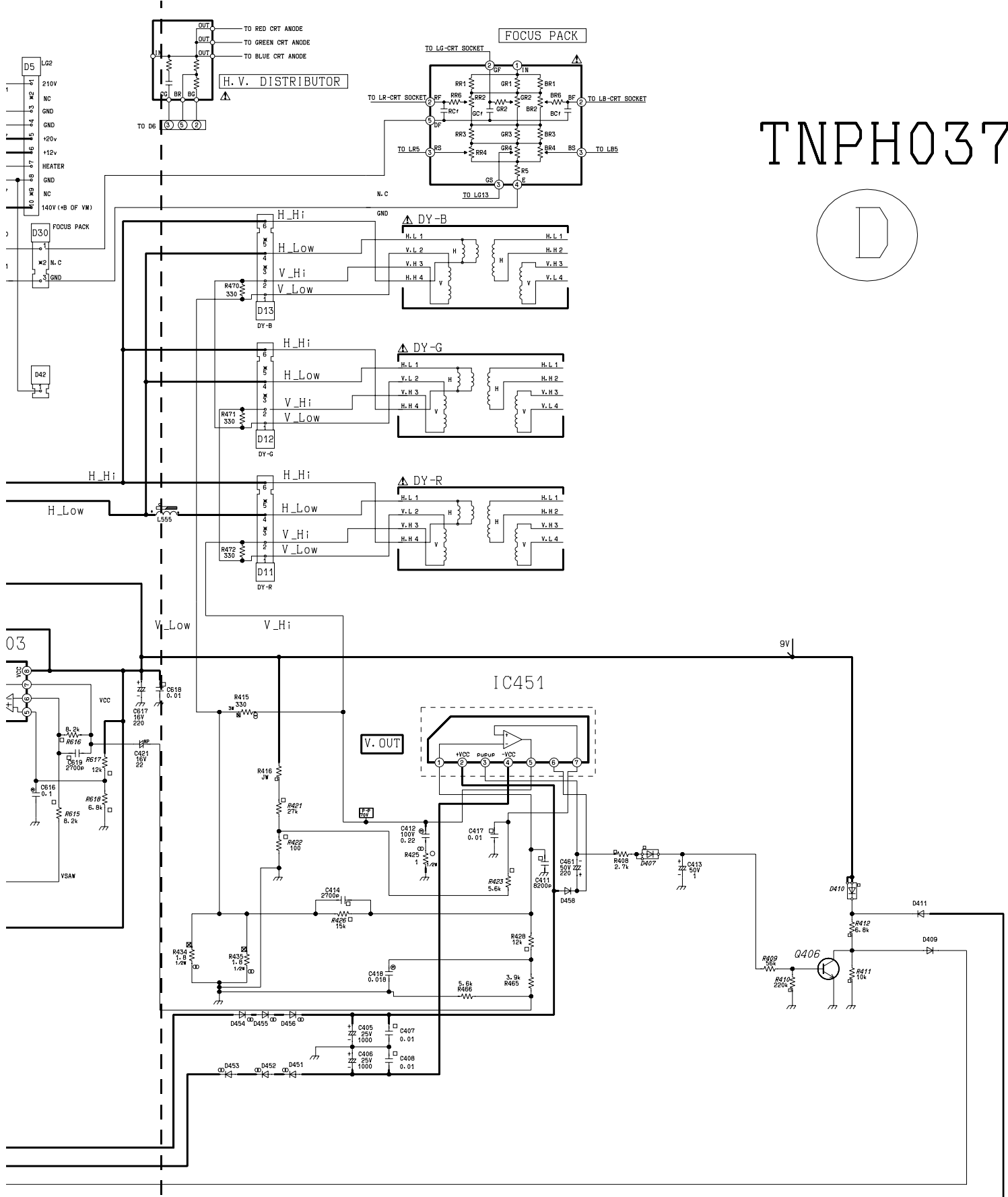
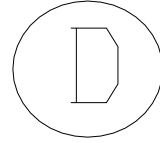
1. Un símbolo como $\textcircled{3}$ indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
 2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
 3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
 4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
 5. El símbolo de tierra \downarrow que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.
- PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.**

Notes





TNPH0371



D-BOARD INTEGRATED CIRCUITS - TNPH0371

IC451	IC601	IC602	IC603	IC701	IC801 ↓	IC802
1 0.04	1 0.24	1 4.28	1 3.83	1 5.92	1 0.06	1 ... 139.20
2 16.74	2 0.06	2 0.62	2 5.29	2 0.60	2 0.06	2 17.93
3 -16.74	3 N.C.	3 12.01	3 5.29	3 1.16	3 0.07	3 GND
4 -17.85	4 N.C.	4 6.08	4 GND	4 GND	4 0.06	<div>IC803</div> <div>1 16.01</div> <div>2 12.01</div> <div>3 GND</div>
5 0.64	5 GND	5 GND	5 3.25	5 5.98	5 GND	
6 16.35	6 6.50	6 4.11	6 3.25	6 3.83	6 -0.14	
7 0.04	7 * 5.17	7 N.C.	7 2.96	7 6.70	7 0.09	
	8 9.06	8 0.61	8 9.06	8 9.06	8 0.70	
	9 2.50	9 4.47			9 0.07	
	10 0.60	10 4.43				
	11 0.86	11 N.C.				
	12 N.C.	12 GND				
	13 GND	13 4.86				
	14 GND	14 3.86				
	15 3.10	15 6.02				
	16 4.43	16 3.19				
	17 4.51					
	18 N.C.					
	19 N.C.					
	20 N.C.					
	21 N.C.					
	22 4.87					
	23 N.C.					
	24 0.28					

IC805
1 19.04
2 GND
3 9.06

IC811
1 19.04
2 18.03

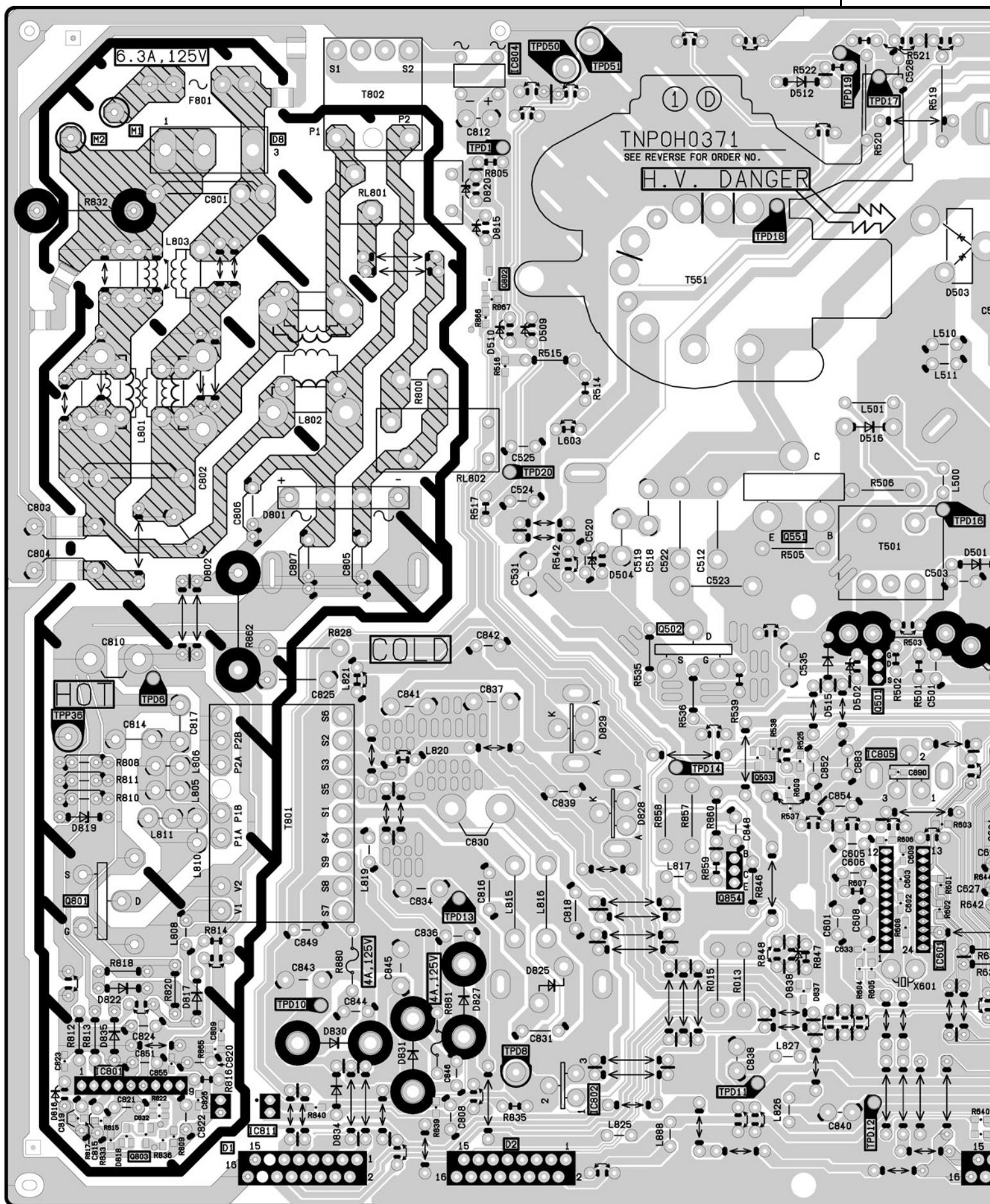
IC1501
1 0.00
2 5.29
3 4.61
4 GND
5 5.82
6 5.82
7 4.28
8 9.06

D-BOARD TRANSISTORS - TNPH0371

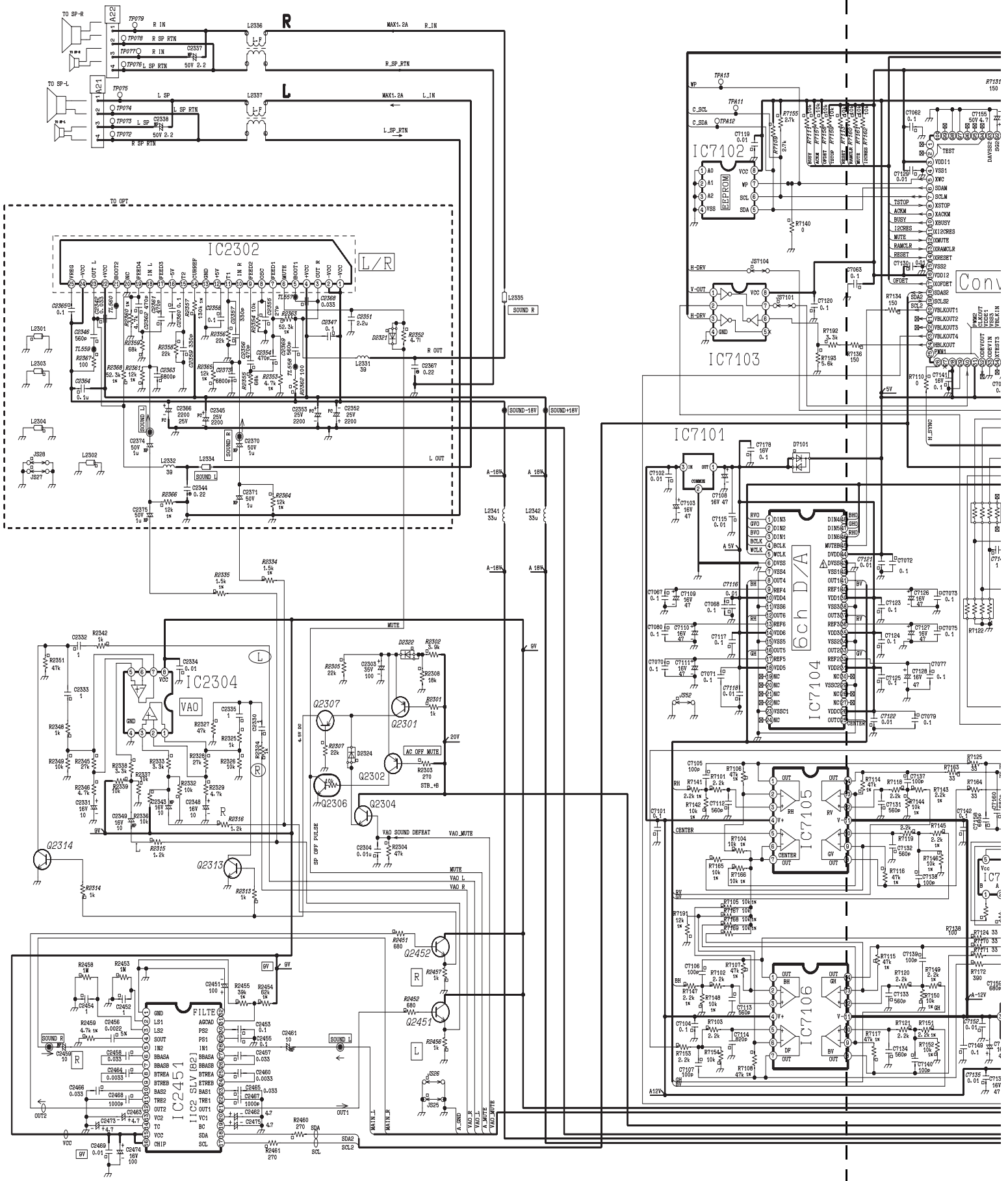
	Q406	Q503	Q509	Q510	Q551 ↓	Q601	Q602	Q603	Q604
B	6.09	0.28	29.39	31.82	0.07	0.60	4.11	0.62	6.07
C	0.06	8.46	138.80	138.80	-4.53	2.76	9.06	6.08	9.06
E	0.00	0.00	31.83	31.32	0.21	0.00	3.53	0.00	5.49
	Q605	Q606	Q802 ↓	Q803 ↓	Q854	Q1503	Q1504	Q1505	
B	4.13	0.03	0.07	0.07	138.80	10.40	11.97	4.04	
C	0.00	10.40	0.07	0.09	0.00	4.14	510.00	10.49	
E	4.71	0.00	0.07	0.07	139.10	10.98	11.46	3.99	
	Q501	Q502	Q701	Q801 ↓					
S	0.00	0.00	0.00	0.07					
D	16.07	0.01	30.80	-40.20					
G	3.09	8.44	6.70	0.12					

Voltages marked with ↓ use HOT ground, please check schematic to confirm the type of ground used for each component

* Set may reset when probing this pin. If TV doesn't turn ON, unplug from AC outlet, plug it back and turn it ON.

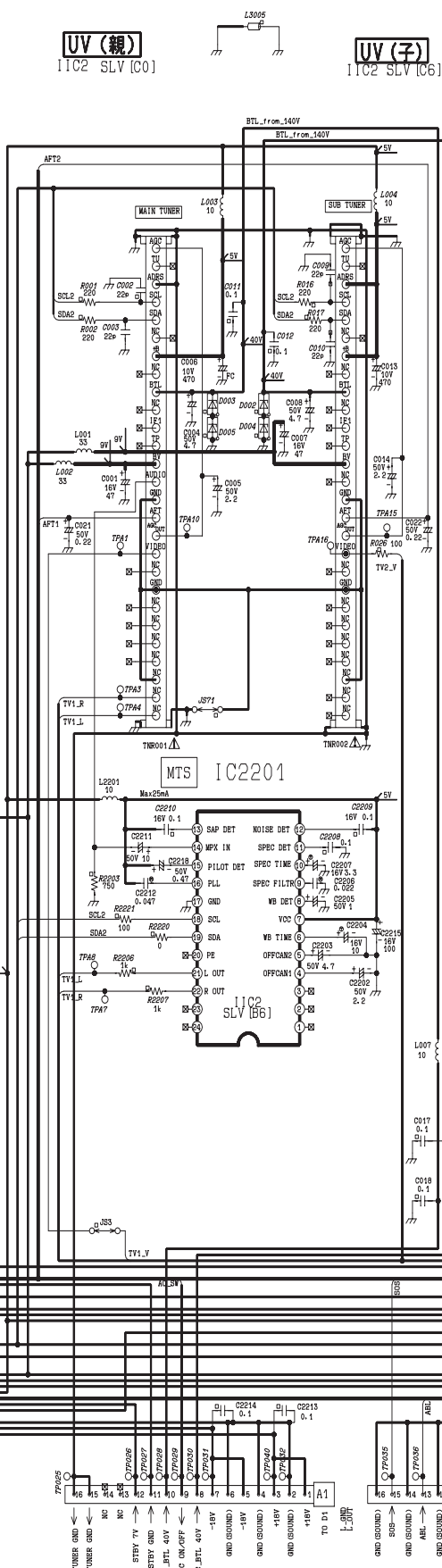
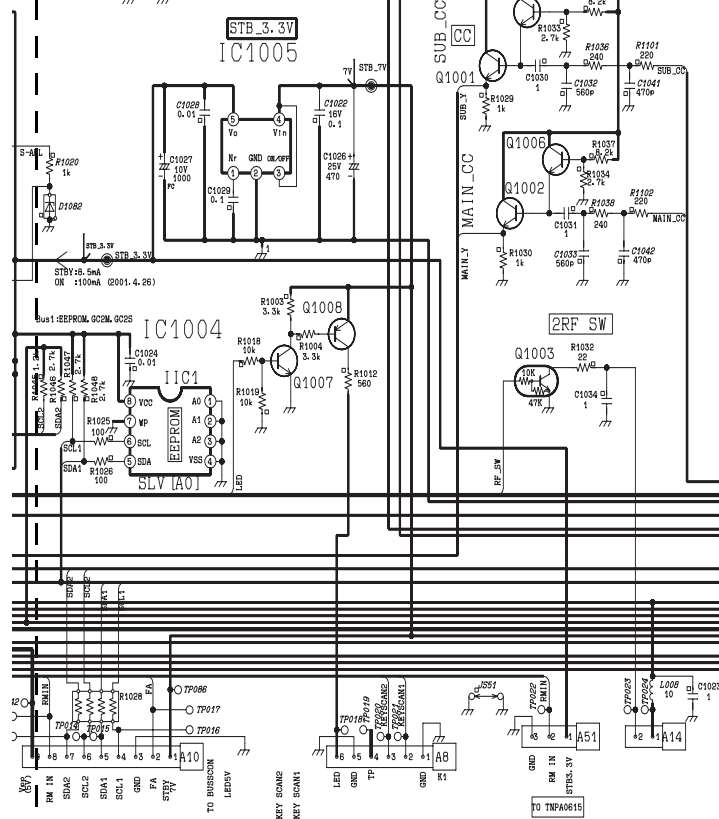






AV-SW部は、3001から

UV (7)

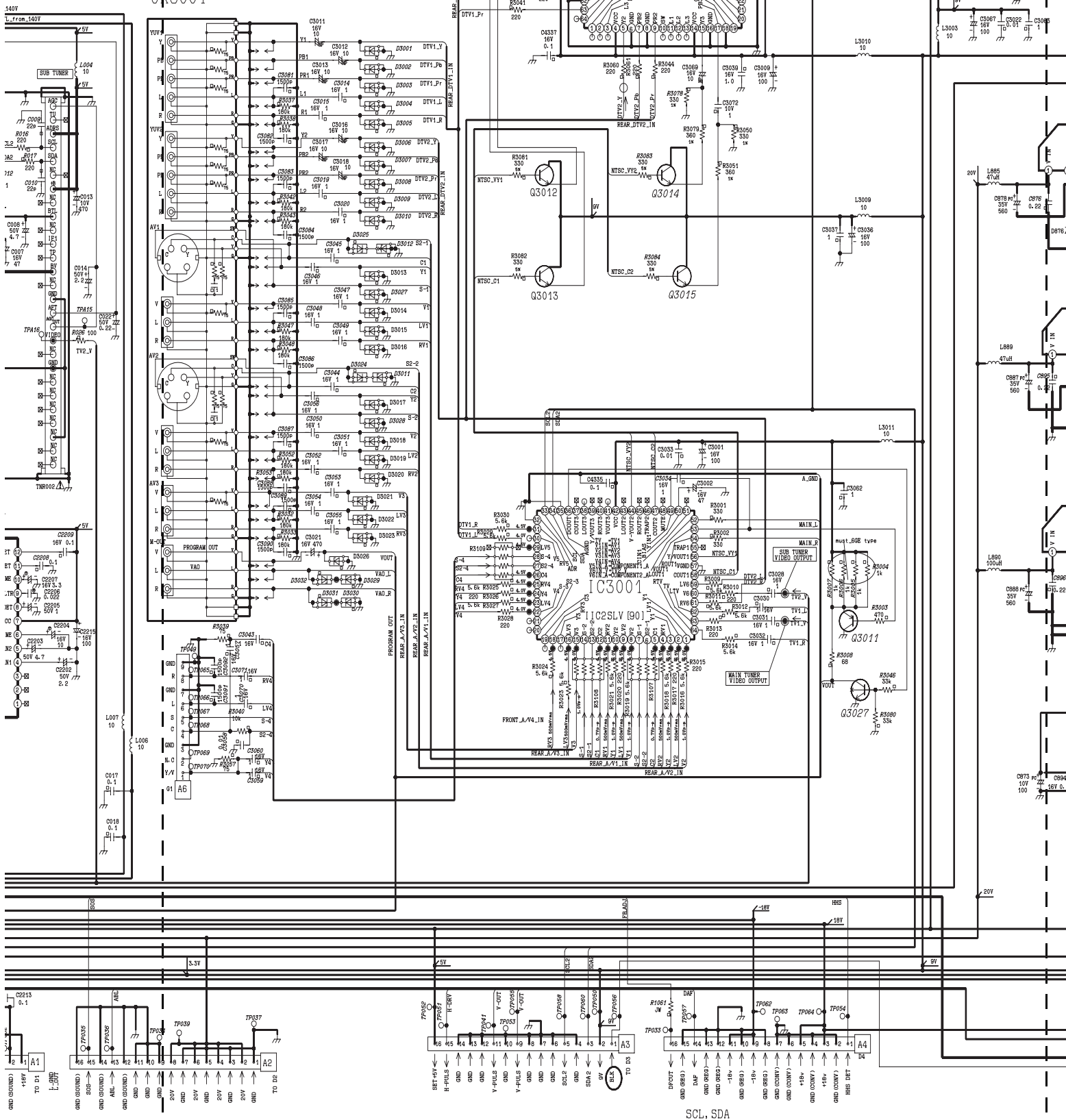


Y SONY MAIN
Y1 301
Y3 SONY SUB/BSO
Y01 SHD-Y
Y02 MAIN
Y03 SUB

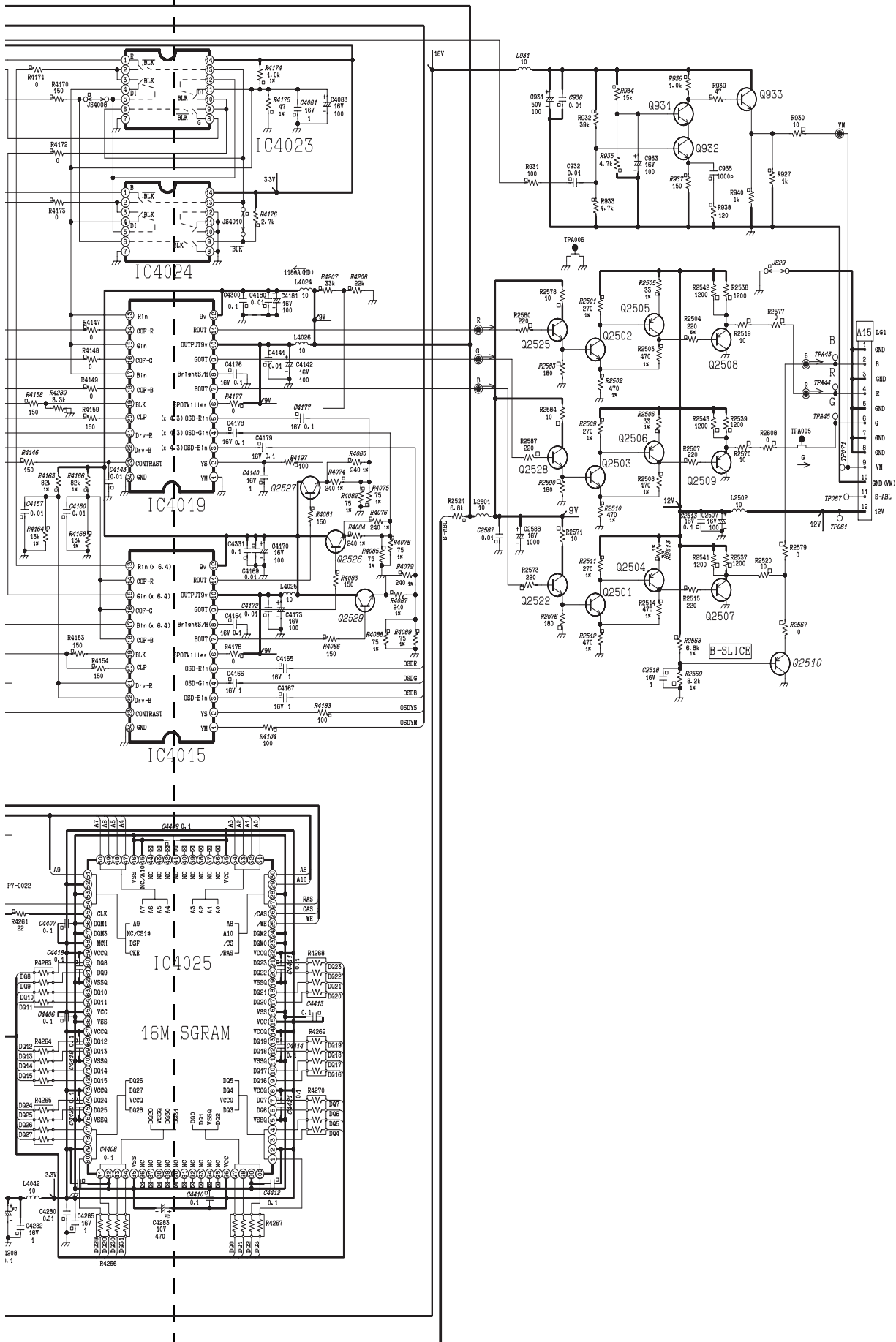
AV-SW部は、3001から

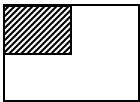
UV(子)
1102 SLV [06]

JK3001

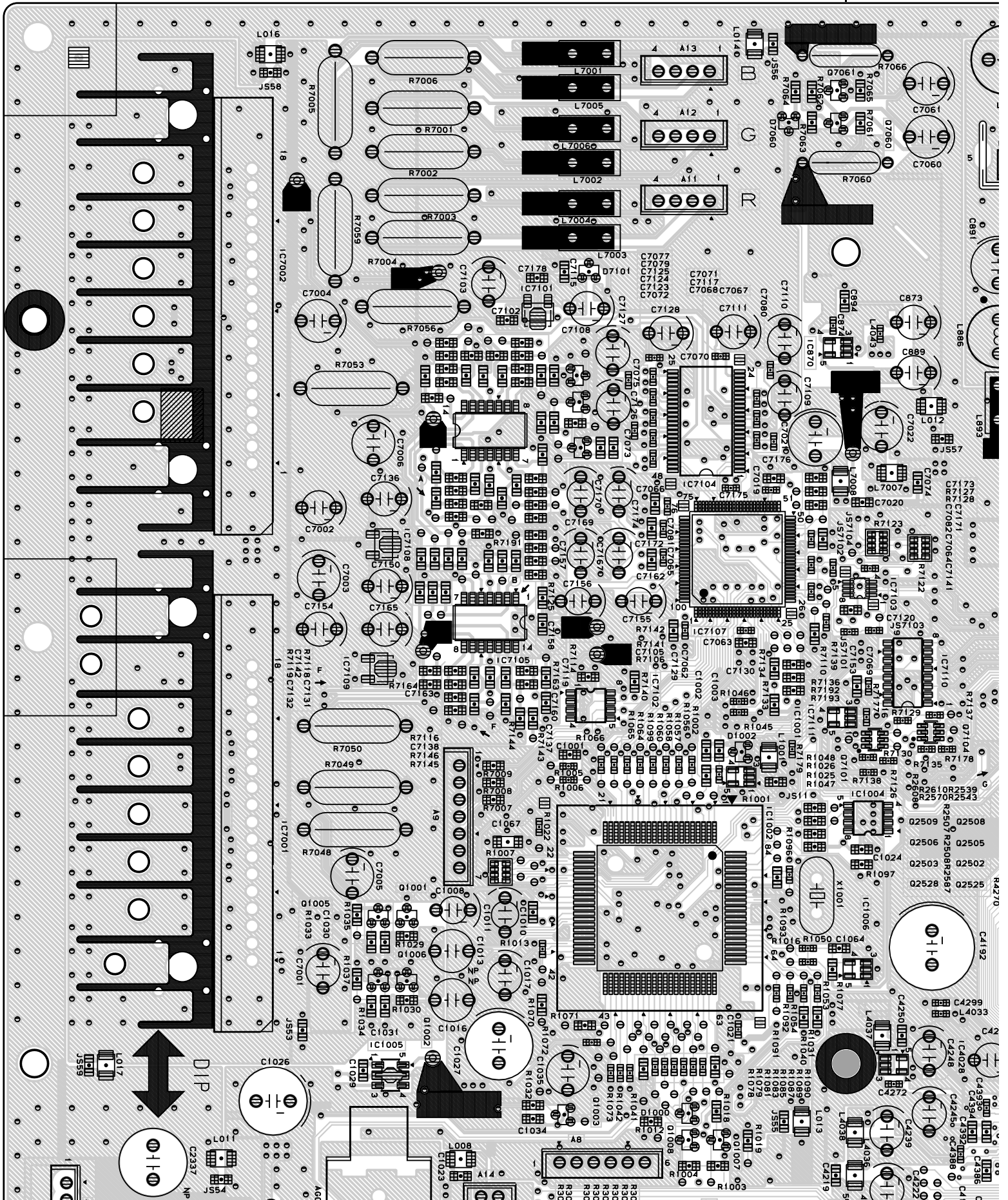


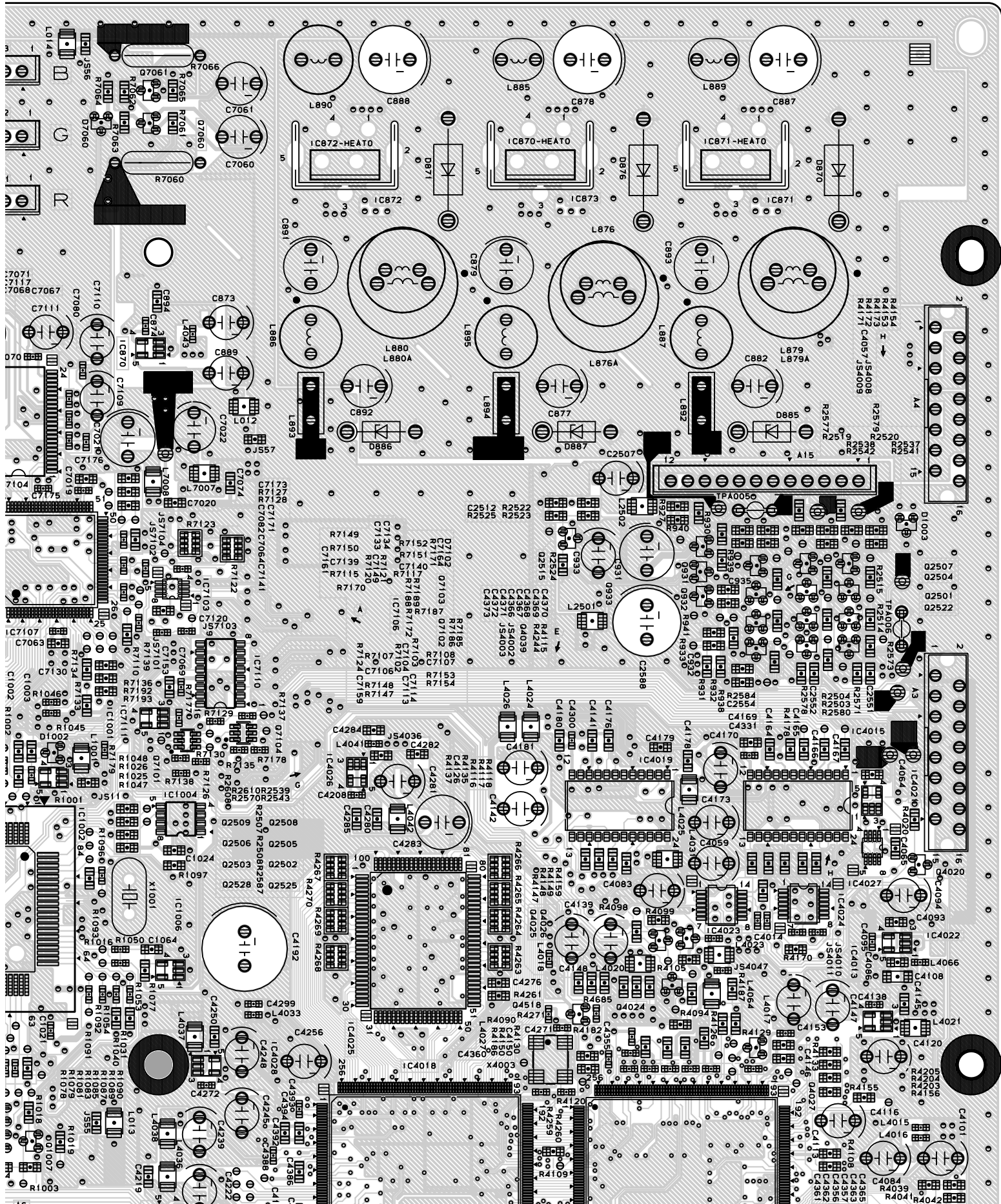
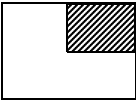


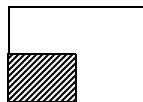




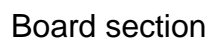
Board section







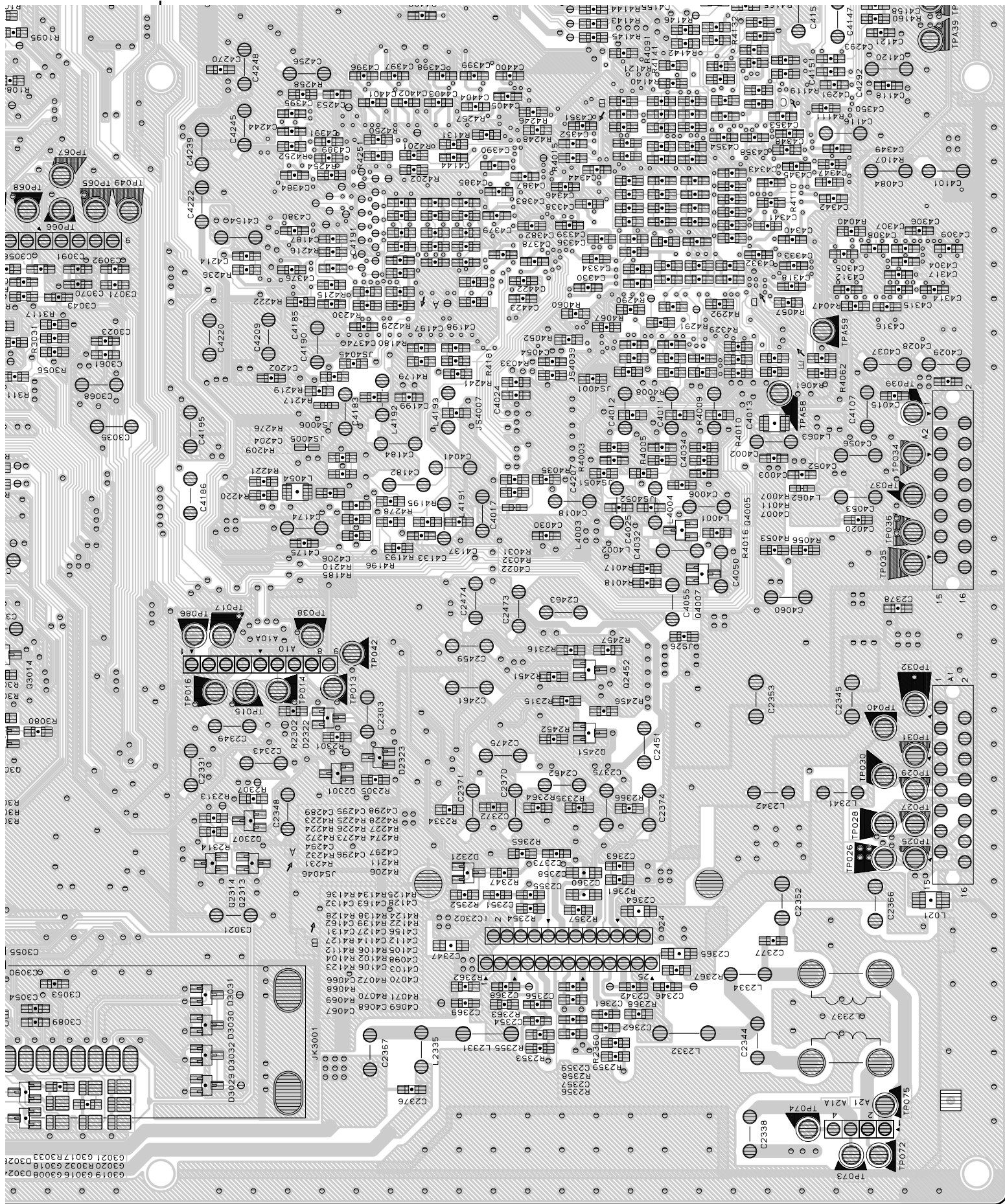
Bottom left portion







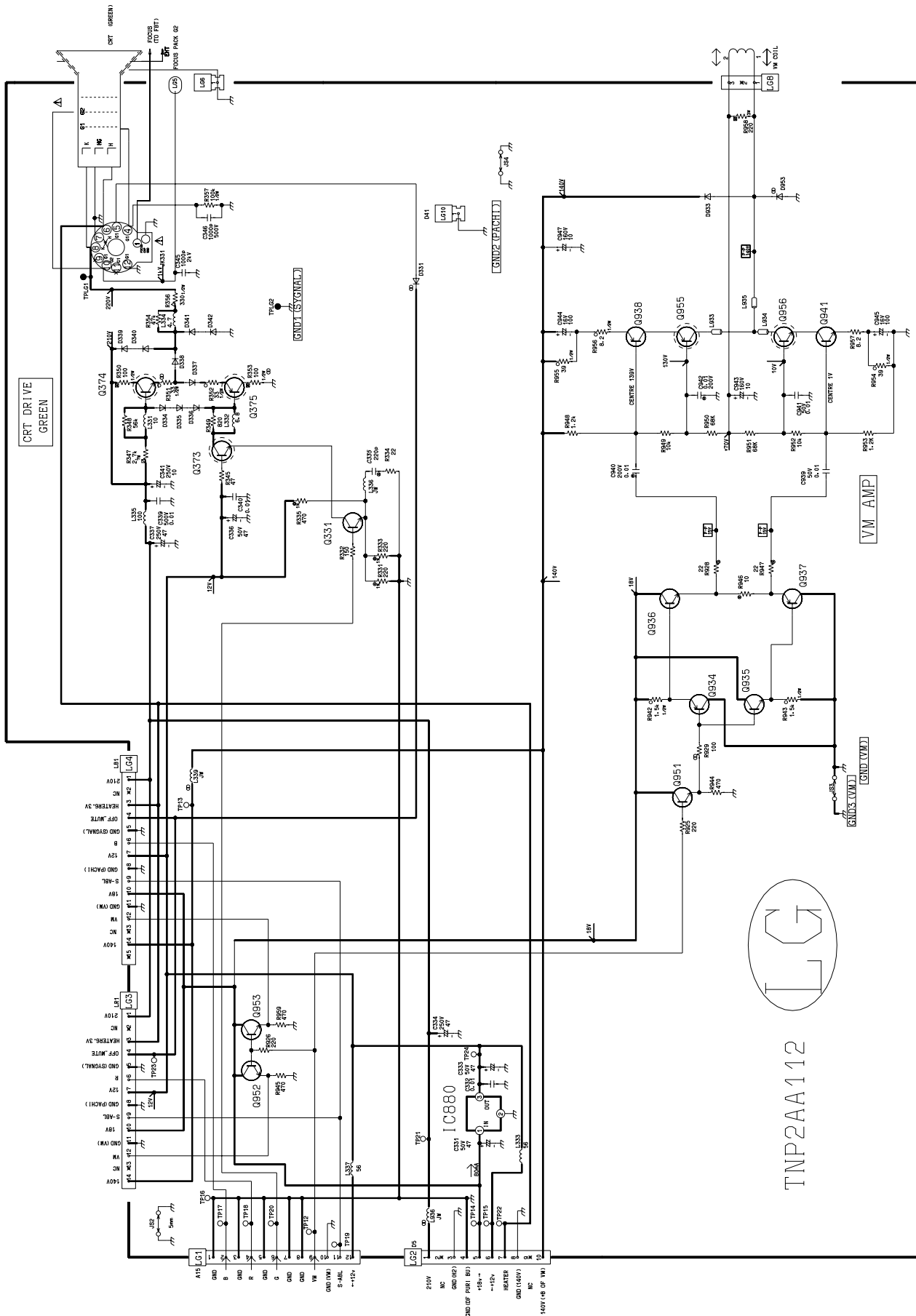
Bottom A-Board Layout



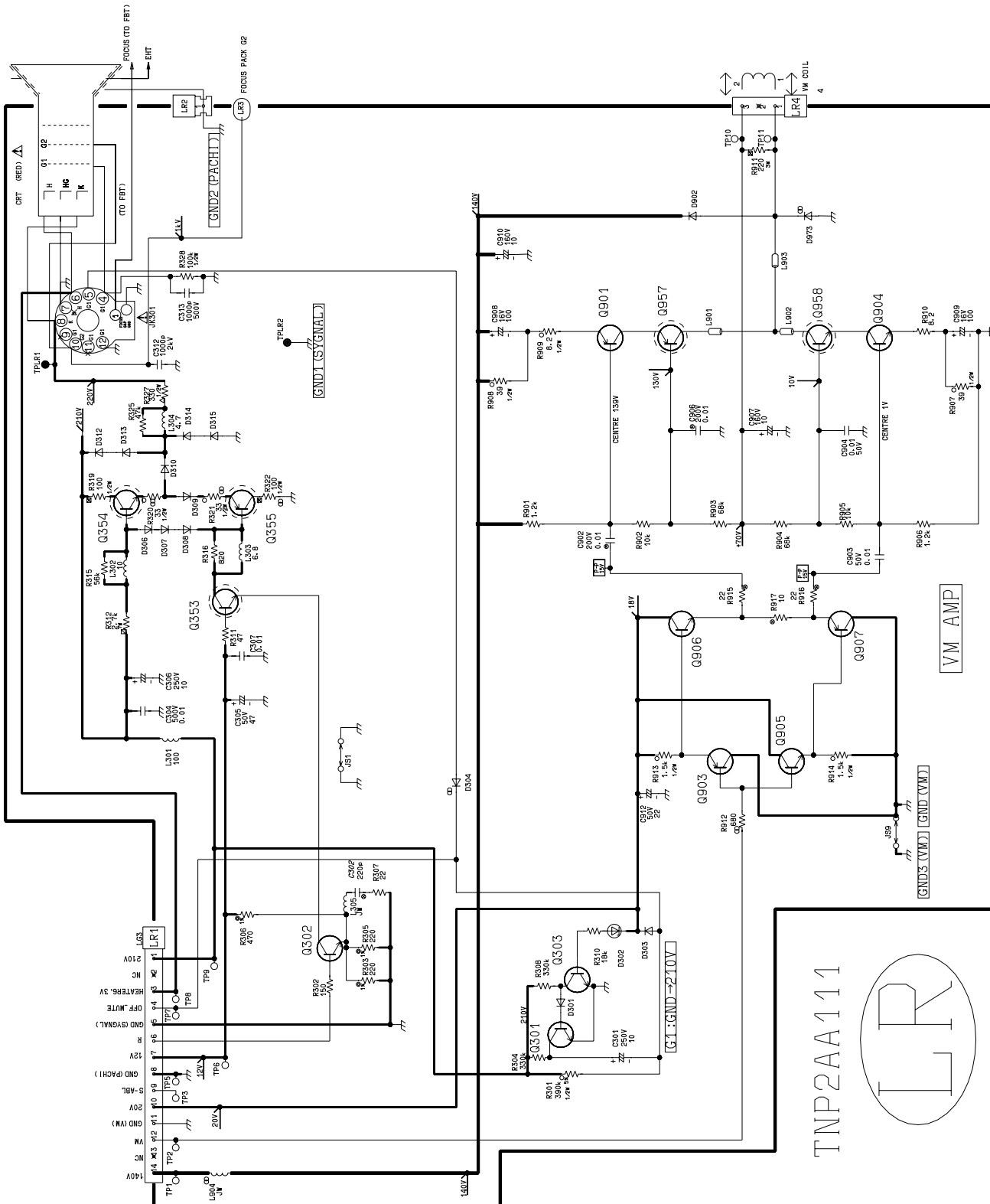
Board section



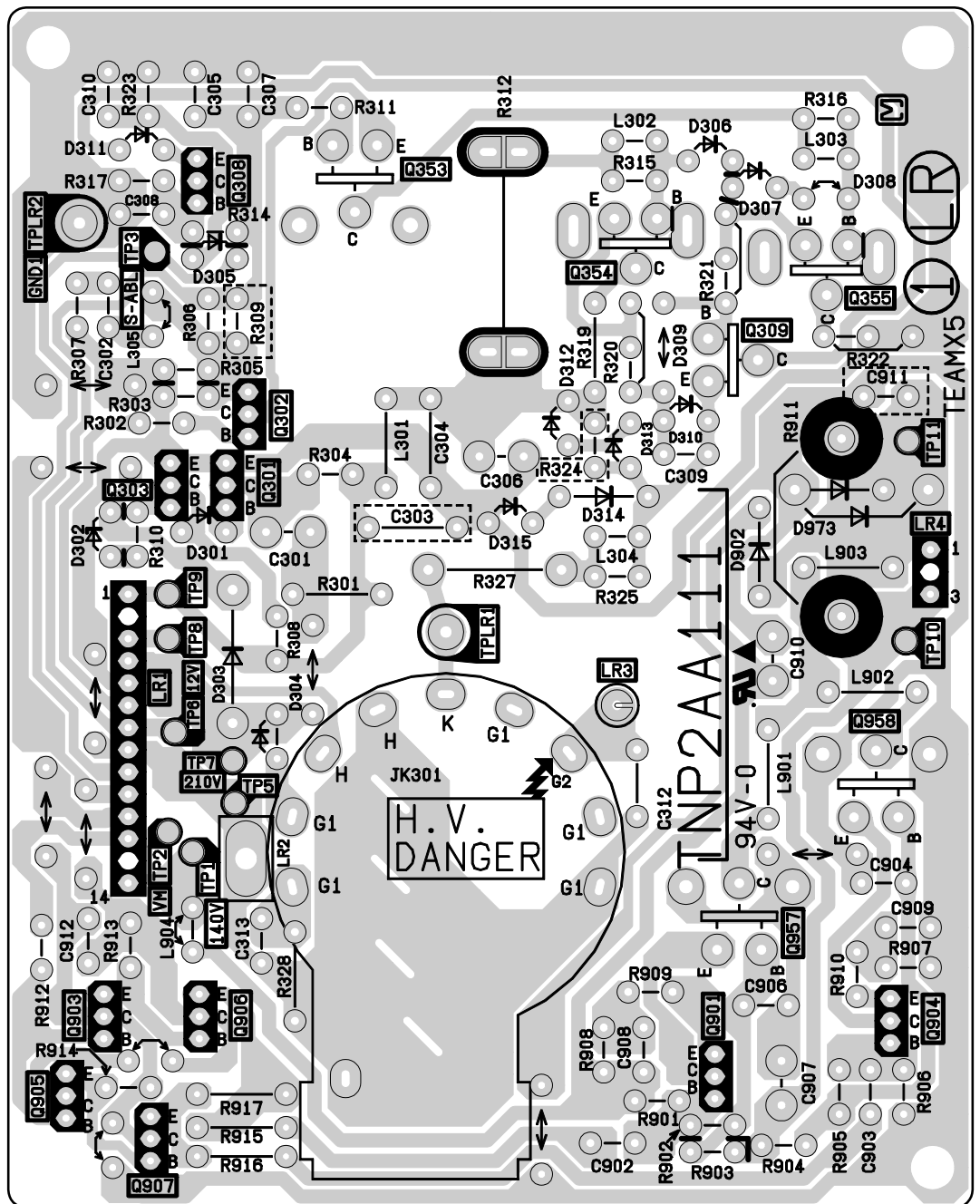
LG-Board schematic - TNP2AA112



	Q331	Q373	Q374	Q375	Q934	Q935	Q936
B	4.05	11.98	172.90	171.50	9.08	9.08	9.68
C	11.61	171.40	218.60	0.43	0.00	18.91	18.91
E	3.85	11.64	172.40	172.10	9.68	8.49	9.11
	Q937	Q938	Q941	Q951	Q952	Q953	Q955
B	2.47	137.80	0.98	9.67	9.65	9.66	129.50
C	0.00	130.10	9.12	18.91	18.91	18.91	71.80
E	9.09	138.40	0.38	9.07	9.09	9.09	130.10
	Q956	LG - Board integrated circuit TNP2AA112			IC880		
B	9.69				1	18.91
C	71.80				2	GND
E	9.12				3	11.99



LR-Board schematic - TNP2AA111

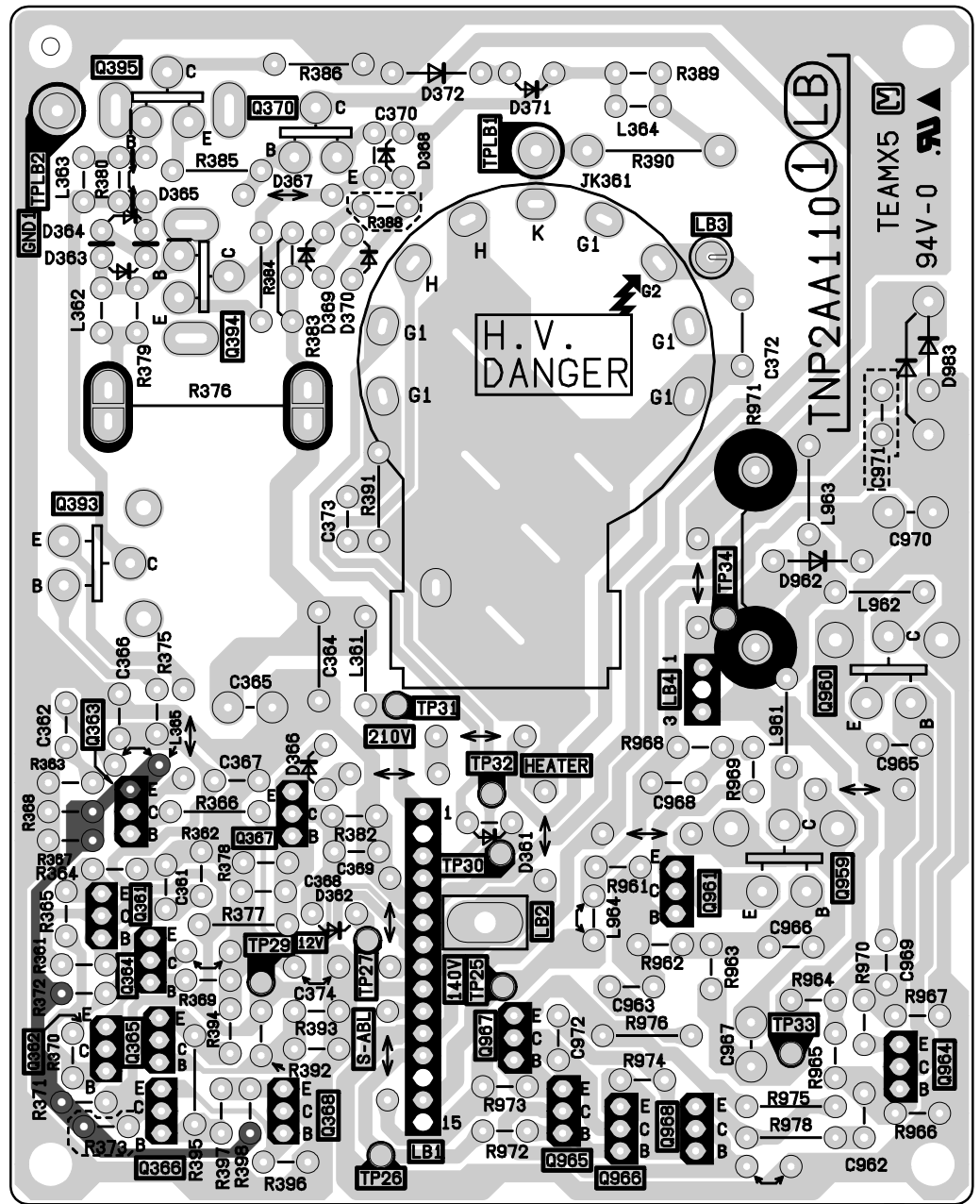


LR-Board voltages - TNP2AA111

	Q301	Q302	Q303	Q353	Q354	Q355	Q901
B	0.11	3.92	0.60	11.98	174.90	173.70	137.80
C	215.90	11.61	0.08	173.70	218.60	0.42	130.20
E	0.00	3.71	0.00	11.65	174.60	174.20	138.40
	Q903	Q904	Q905	Q906	Q907	Q957	Q958
B	9.10	0.97	9.10	9.72	8.49	129.60	9.69
C	0.00	9.12	8.90	18.91	6.00	71.30	71.30
E	9.73	0.37	8.49	9.13	9.11	130.20	9.12



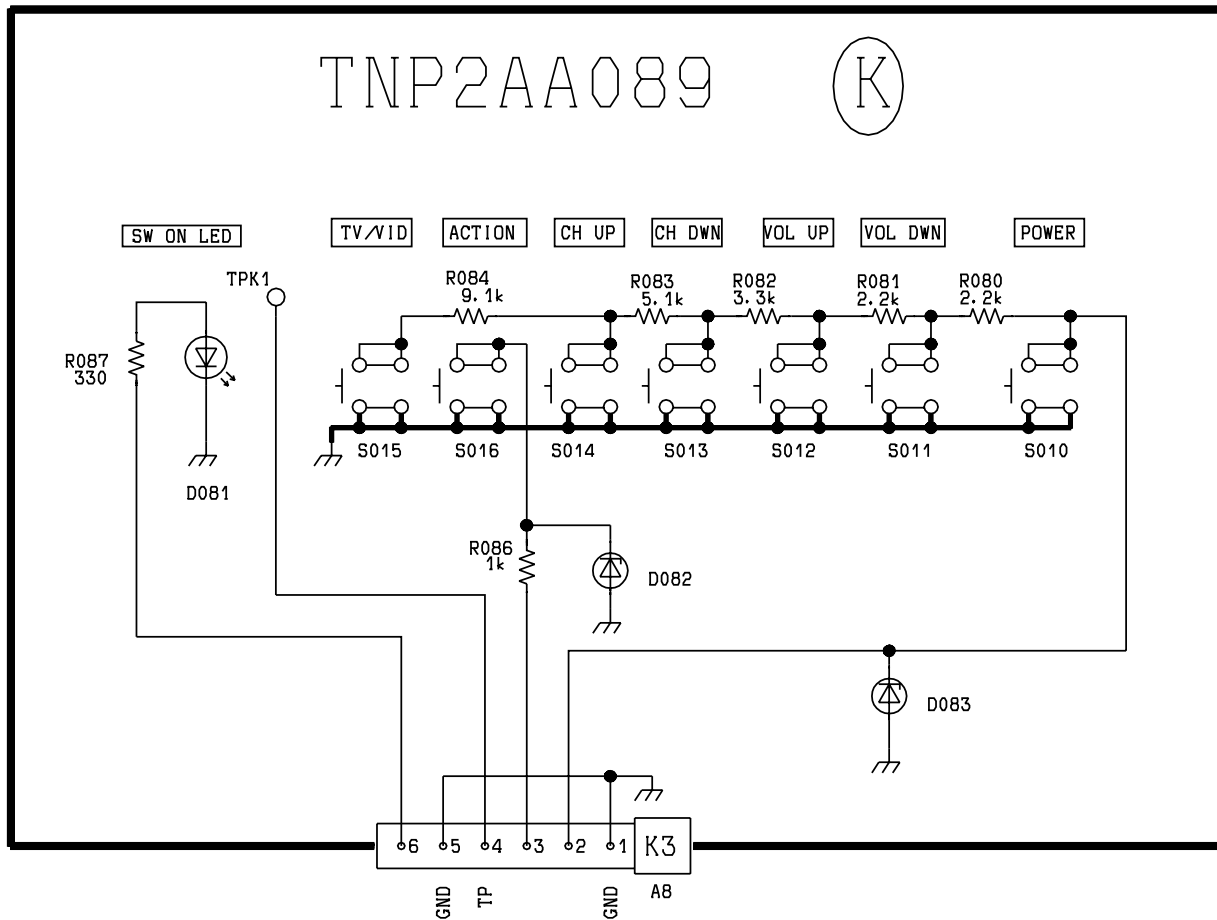
LB-Board layout - TNP2AA110



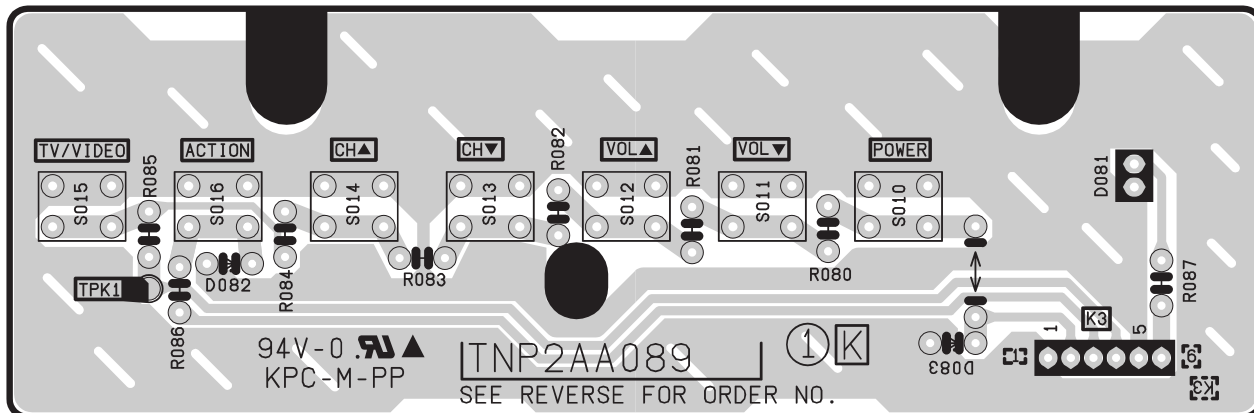
LB-Board voltages- TNP2AA110

	Q361	Q362	Q363	Q364	Q365	Q366	Q368
B	5.14	4.51	3.86	3.92	5.91	5.08	4.48
C	11.98	11.98	11.54	0.00	11.98	11.98	0.00
E	4.51	3.92	3.70	3.51	5.28	4.48	3.96
	Q393	Q394	Q395	Q959	Q960	Q961	Q964
B	11.98	172.00	170.60	129.30	9.67	137.80	0.98
C	170.60	218.60	0.42	71.40	71.50	129.90	9.10
E	11.54	171.90	171.50	129.90	9.10	138.40	0.37
	Q965	Q966	Q967	Q968			
B	9.09	9.09	9.72	8.50			
C	0.00	18.91	18.91	0.00			
E	9.72	8.49	9.14	9.11			

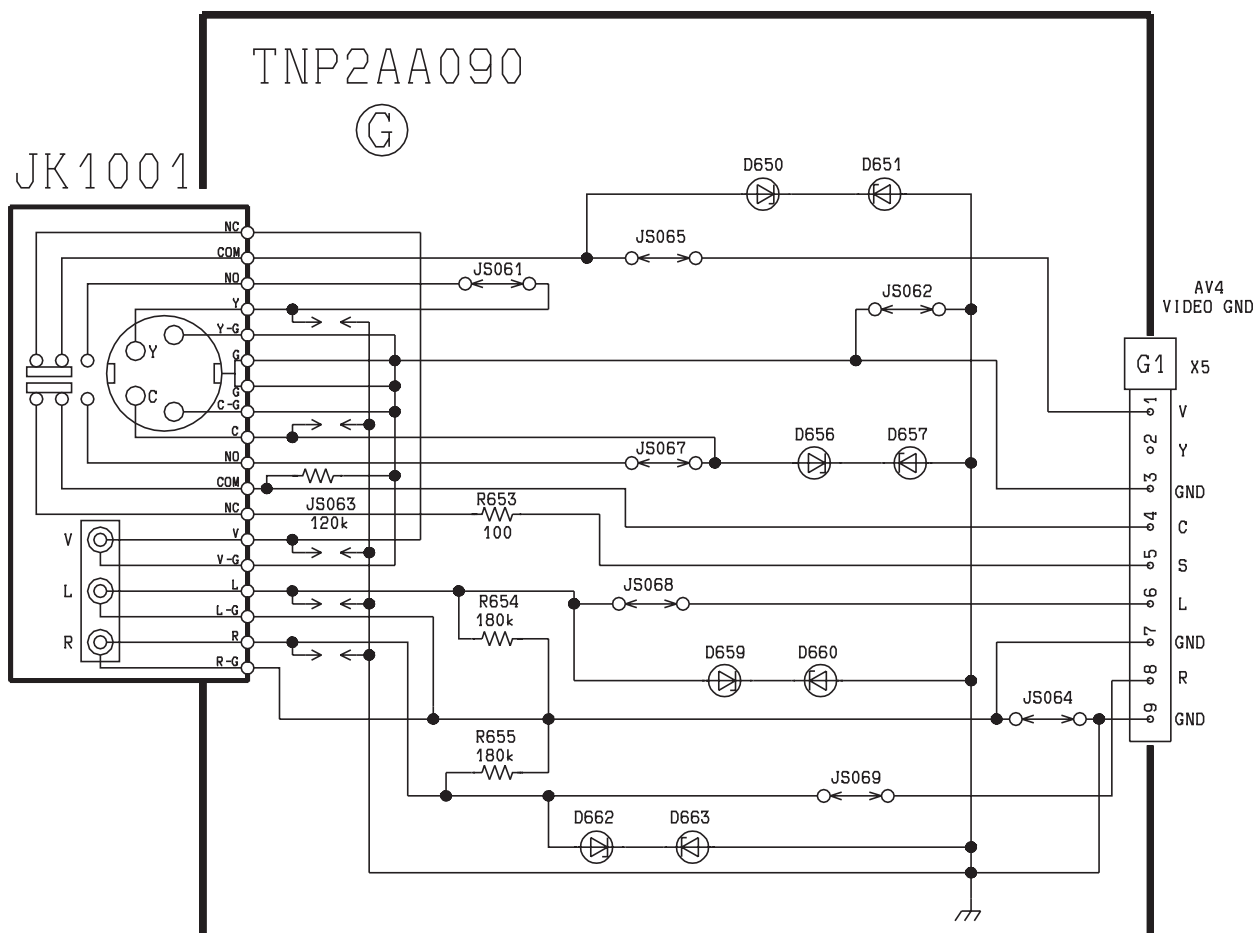
K-Board schematic - TNP2AA089



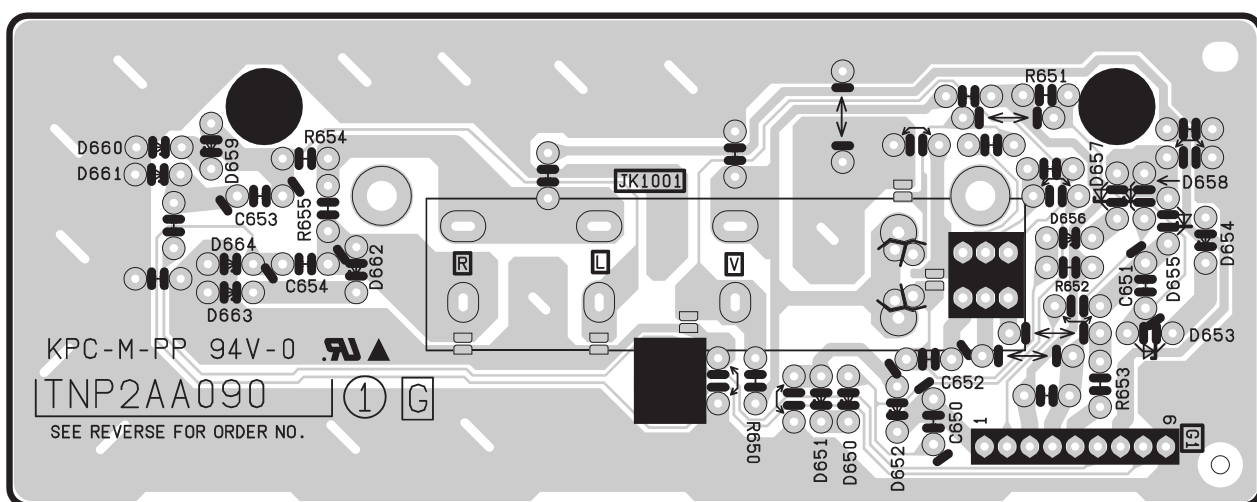
K-Board layout - TNP2AA089



G-Board schematic - TNP2AA090



G-Board layout - TNP2AA090



D-Board integrated circuits voltages - TNPH0371

IC451	IC601	IC602	IC603	IC701	IC801 ↓
1 0.04	1 0.24	1 4.28	1 3.83	1 5.92	1 0.06
2 16.74	2 0.06	2 0.62	2 5.29	2 0.60	2 0.06
3 ... -16.74	3 N.C.	3 12.01	3 5.29	3 1.16	3 0.07
4 ... -17.85	4 N.C.	4 6.08	4 GND	4 GND	4 0.06
5 0.64	5 GND	5 GND	5 3.25	5 5.98	5 GND
6 16.35	6 6.50	6 4.11	6 3.25	6 3.83	6 -0.14
7 0.04	7 * 5.17	7 N.C.	7 2.96	7 6.70	7 0.09
	8 9.06	8 0.61	8 9.06	8 9.06	8 0.70
	9 2.50	9 4.47			9 0.07
	10 0.60	10 4.43			
	11 0.86	11 N.C.			
	12 N.C.	12 GND			
	13 GND	13 4.86			
	14 GND	14 3.86			
	15 3.10	15 6.02			
	16 4.43	16 3.19			
	17 4.51				
	18 N.C.				
	19 N.C.				
	20 N.C.				
	21 N.C.				
	22 4.87				
	23 N.C.				
	24 0.28				

IC805	IC1501	IC802
1 19.04	1 0.00	1 ... 139.20
2 GND	2 5.29	2 17.93
3 9.06	3 4.61	3 GND
	4 GND	
	5 5.82	
	6 5.82	
	7 4.28	
	8 9.06	

IC811	IC803
1 19.04	1 16.01
2 18.03	2 12.01
	3 GND

D-Board transistors voltages - TNPH0371

	Q406	Q503	Q509	Q510	Q551 ↓	Q601	Q602	Q603
B	6.09	0.28	29.39	31.82	0.07	0.60	4.11	0.62
C	0.06	8.46	138.80	138.80	-4.53	2.76	9.06	6.08
E	0.00	0.00	31.83	31.32	0.21	0.00	3.53	0.00

	Q604	Q605	Q606	Q802 ↓	Q803 ↓	Q854	Q1503	Q1504
B	6.07	4.13	0.03	0.07	0.07	138.80	10.40	11.97
C	9.06	0.00	10.40	0.07	0.09	0.00	4.14	510.00
E	5.49	4.71	0.00	0.07	0.07	139.10	10.98	11.46

	Q1505	Q501	Q502	Q701	Q801 ↓
S	4.04	0.00	0.00	0.00	0.07
D	10.49	16.07	0.01	30.80	-40.20
G	3.99	3.09	8.44	6.70	0.12

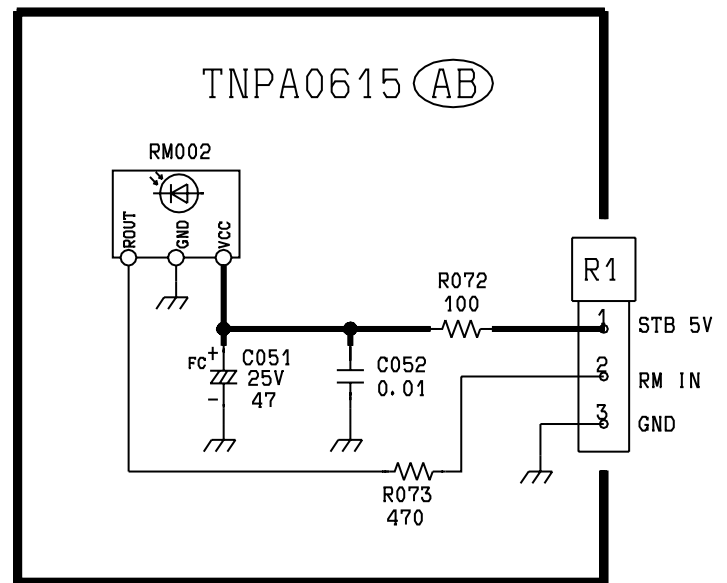
Voltages marked with ↓ use HOT ground, please check schematic to confirm the type of ground used for each component

* Set may reset when probing this pin. If TV does not turn ON, unplug from AC outlet, plug it back and turn it ON.

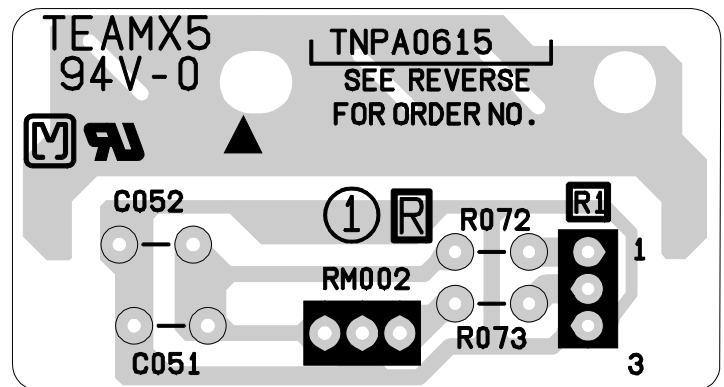
A-Board integrated circuits voltages - TNP2AH035

IC2302	IC7002	IC7001
4 ... -23.50	1 GND	1 GND
5 ... -23.45	2 GND	2 GND
6 -0.35	3 -18.59	3 -18.60
7 20.99	4 -19.70	4 -19.70
8 9.36	5 18.85	5 18.84
9 4.90	6 -0.11	6 -0.40
10 0.00	7 -0.11	7 -0.39
11 2.54	8 -19.71	8 -19.70
12 0.05	9 -0.13	9 -0.53
13 0.00	10 18.84	10 18.84
14 0.00	11 -0.47	11 0.00
15 5.20	12 -19.72	12 -19.70
16 GND	13 -0.36	13 0.00
17 ... -22.09	14 -0.37	14 0.00
18 0.00	15 -0.23	15 -0.36
19 -5.31	16 -0.23	16 -0.35
20 0.06	17 -19.71	17 -19.70
21 0.00	18 -0.28	18 -0.48
22 0.00		
23 N.C.		
24 9.30		
25 20.99		
26 -0.32		
27 ... -23.45		
28 ... -13.20		

R-Board schematic - TNPA0615AB



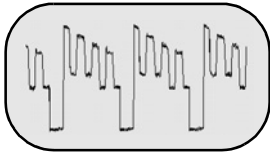
R-Board layout - TNPA0615



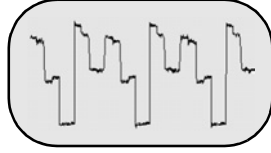
Voltages marked with ↓ use HOT ground, please check schematic to confirm the type of ground used for each component

* Set may reset when probing this pin. If TV does not turn ON, unplug from AC outlet, plug it back and turn it ON.

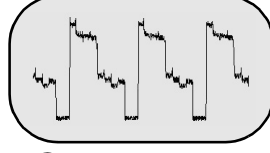
A-Board



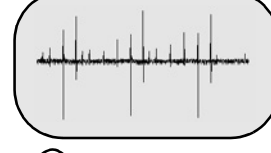
① **5.84 Vp-p**
A15 PIN 2 (BLUE OUT)



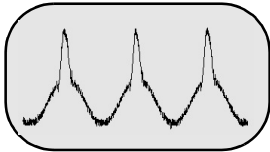
② **5.60 Vp-p**
A15 PIN 4 (RED OUT)



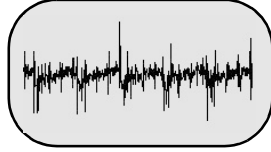
③ **6.32 Vp-p**
A15 PIN 6 (GREEN OUT)



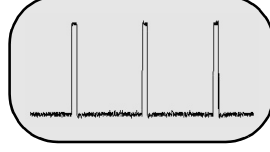
④ **2.74 Vp-p**
A15 PIN 9 (VM OUT)



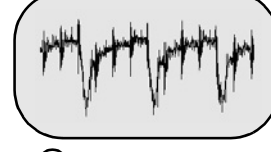
⑤ **1.70 Vp-p**
A15 PIN 11 (S-ABL)



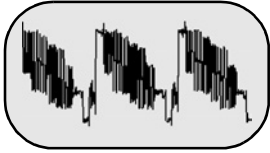
⑥ **0.14 Vp-p**
A4 PIN 16 (DFCUT)



⑦ **3.24 Vp-p**
A3 PIN 15

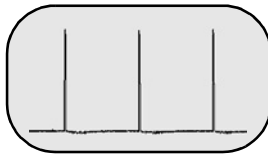


⑧ **0.17 Vp-p**
A2 PIN 13 (ABL)

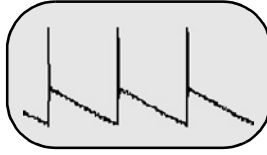


⑩ **1.00 Vp-p**
TNR001 (VIDEO)

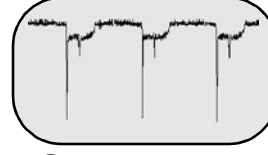
D-Board



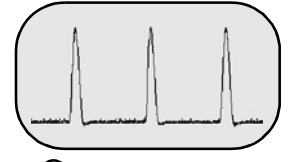
⑬ 36.0 Vp-p
IC451 PIN 3



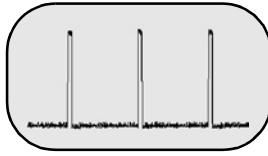
⑭ 68.8 Vp-p
IC451 PIN 5 (V-OUT)



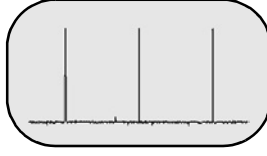
⑮ 14.0 Vp-p
Q551-B



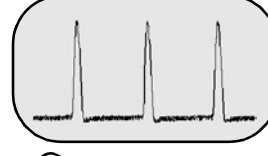
⑯ 1.50 KVp-p
Q551-C



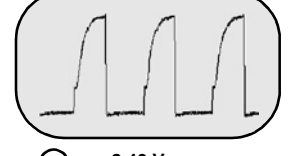
⑰ 3.12 Vp-p
IC601 PIN 1 (H-PULSE)



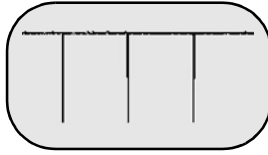
⑱ 3.20 Vp-p
IC601 PIN 2 (VP3)



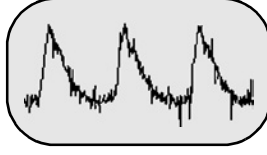
⑲ 6.48 Vp-p
IC601 pin 10 (fbp in)



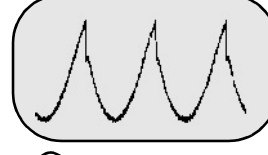
⑳ 8.40 Vp-p
IC601 PIN 15 (H-DRIVE OUT)



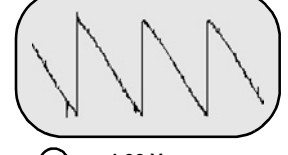
㉑ 4.96 Vp-p
IC601 PIN 22 (V-PULSE OUT)



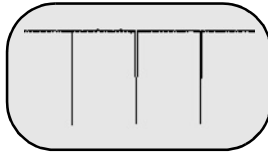
㉒ 0.53 Vp-p
IC602 PIN 1 (EHT FB ADJ)



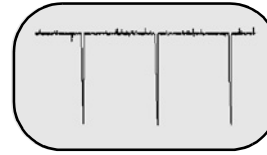
㉓ 1.70 Vp-p
IC602 PIN 4 (EW FB)



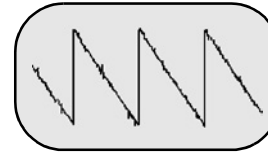
㉔ 1.90 Vp-p
IC602 PIN 6 (V FB)



㉕ 4.80 Vp-p
IC602 PIN 13 (V IN)

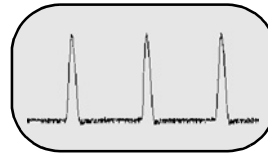


㉖ 2.84 Vp-p
IC602 PIN 14 (TC)



㉗ 2.04 Vp-p
IC602 PIN 15 (RAMP)

LG-Board



⑫ 27.6 Vp-p
LG2 PIN 7 (HEATER)

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